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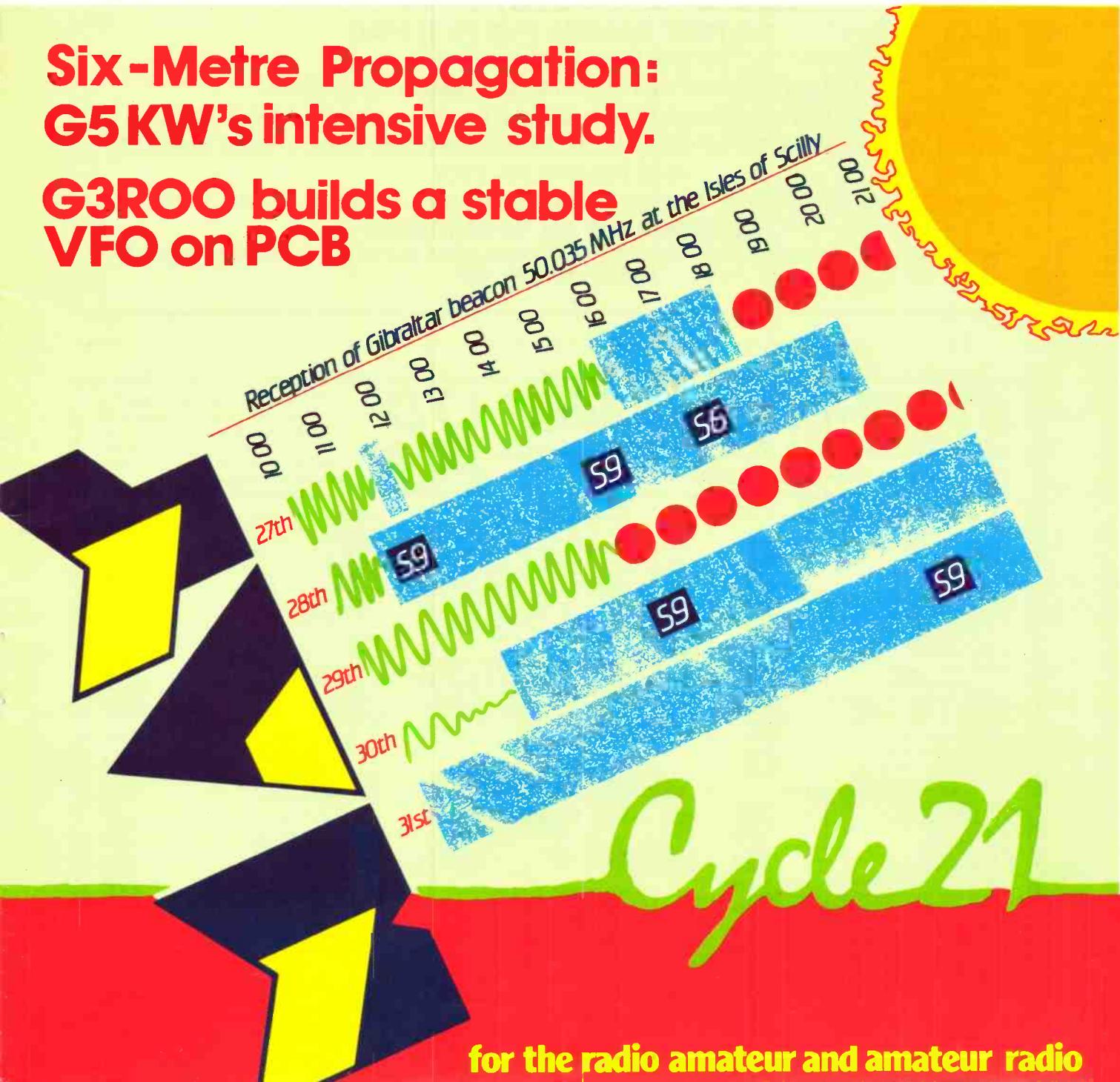
The SHORTWAVE Magazine

May 1986

Volume 44 Number 3

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(GB3SWM)

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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.

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**READERS'
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from the next issue!

(see page 119)



WORLD-WIDE COMMUNICATION

VHF BANDS

NORMAN FITCH, G3FPK

MARCH was notable, not so much for any good radio conditions, but for the tremendous gales; 156 m.p.h. gust recorded in Scotland in the Cairngorms on the 20th, and the south getting a battering on the 24th. At 1050, Luton airport reported a 75 knot gust (88 m.p.h.) and no doubt there were many local, destructive gusts all over the Midlands and south that day. Although said to be a once-in-fifty-years hurricane, your scribe recalls a couple of worse gales in the London area since 1970. There were tales of damage to, and destruction of, antennas and masts and one story on 2m. concerned someone whose collapsing antenna had taken part of the wall with it.

VHF Convention

The other, more pleasant, event was the RSGB's *National VHF Convention* at Sandown Park Racecourse on March 16 and apologies for misleading readers by stating that British Summer Time was destined to commence that day. That is what is advised in the diary, without the usual, "subject to confirmation" note. There was a very long queue waiting to get in when your scribe arrived and it was fortunate that it was a fine, sunny morning.

There were no tickets at the turnstiles or any leaflets listing the exhibitors or the lectures so it was a matter of fighting one's way around the stands on a hit-and-miss basis. As far as can be recalled, all the usual people were there from the established manufacturers, such as *muTek* and *Microwave Modules*, to what were little more than junk stalls. There was interest in the new 6m. band and *MM* announced their new MMT50/144 transverter, which was due to be launched at the N.E.C. Exhibition. This is a linear transverter to be used with a 2m. transceiver. The Tx side needs from 150 mW to 15W drive and the output power is 20W. Therefore, used with a 7 dB gain antenna system, the maximum licensed *e.r.p.* can be achieved from one piece of equipment. The overall specification is quite impressive and a lot of care and thought has gone into the design of this. The price suggested was £145. this will be in competition with the fine *muTek* TVVF 50c currently offered at £209.90.

Metalfayre exhibited their own range of MET antennas which are based on the N.B.S. research. Hovering above the stand was their new 5-ele. 6m. *Yagi* with a 4.77m. boom and a claimed gain of 9.2 dBd at £59.90. They also produce a 3-ele. *Yagi* with a 2.39m. boom for £39.95 and it has a 7.1 dBd gain. *Randam Electronics* had a display of the French *Tonna* antennas. For 6m. they offer a 5-ele. *Yagi* on a 3.5m. boom with a gain of 7.85 dBd claimed. The new 55-ele. *Yagi* for 23cm. was on display. This is 4.64m. long with a claimed gain of 19.35 dBd and a -3 dB horizontal beamwidth of 13.4°. The prices are £37.87 and £44.75 respectively, plus carriage.

The RSGB stand incorporated various groups, such as VHF and Microwaves, and there was an equipment measuring facility too which was in great demand for much of the time. Your scribe was able to have lengthy discussions with G5KW and G2AHU about 6m. matters including the former's articles in this Magazine commencing this issue.

As usual, one would have liked to have been able to attend more lectures but it is only possible to go to three out of the nine. *VHF/UHF Propagation and the Weather*, by Jim Bacon, G3YLA, played to a packed house. He proved to be an excellent lecturer, able to explain this important connection in a concise, yet entertaining and humorous way. David Butler's, G4ASR, talk on *Optimizing your VHF/UHF Station* did not produce any revolutionary ideas and he drew extensively on work previously published by others.

The talk by Ray Cracknell, G2AHU, on *50 MHz results and expectations for the future* was well attended. Before returning to England, Ray spent many years in Rhodesia as ZE2JV during which he gained unique experience of transequatorial propagation — TEP — from southern Africa to the Mediterranean. He undertook the task of collating the reports from the original U.K. 50 MHz permit holders on behalf of the RSGB and from which some interesting facts have emerged about tropo. and *Auroral* propagation. It is to be hoped these reports will be published in due course and that they will not gather dust in the RSGB's Propagation Studies Committee's files. (It is worth pointing out that Charlie Newton's, G2FKZ, work on the Boundary Fence theory for *Ar* propagation was never published in *RadCom*, so had to be offered to the privately published *DUBUS Magazine*.)

The attendance at the Convention was probably around 3,000 based upon the advanced ticket sales, cash takings on the day, plus those manning the stands. At times it was quite a fight to circulate in the hall and one concludes that the change from a Saturday to a Sunday event probably accounted for the extra

attendance. Anyway, your scribe enjoyed it, especially meeting old and new friends, although more were missed than met, as usual.

Class B Morse

According to an item in the *GB2RS* news bulletin on April 6, 91% of those who answered the questionnaire in the February *RadCom* wanted the Class B Morse experiment to continue. The Society had submitted the results of these findings to the *D.T.I.* and as this is being written, a decision was awaited. If this facility is reinstated, it is to be hoped that the *RSGB* will adopt a very positive stance by firmly recommending that the SSB section of 2m., i.e. 144.15 to 144.5 MHz is not used for Morse practice sessions.

The reasoning is that this part of the band, together with the exclusive CW allocation in the lowest 150 kHz of 2m., is the only remaining area wherein real DX can be worked. From May to August, *Sporadic E* openings do occur and these create mayhem. Strong local CW practice sessions right in the middle of all this action are bound to cause friction, all the more so when some of the signals are full of key clicks.

Until the *D.T.I.* makes an official

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

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

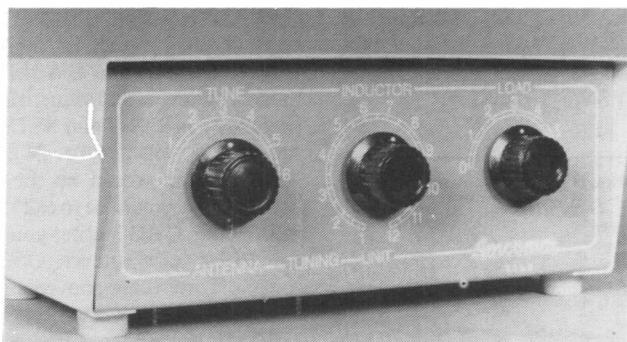
Please be sure to note these dates.

announcement, Class B licensees have no authority to transmit CW, since the variation ended on March 31. However, they can participate in slow Morse practice transmissions from Class A licensees as they have been doing for years to improve their receiving ability.

Beacons

The German national society DARC is putting forward a proposal to reduce the 2m. beacon band to a mere 20 kHz centred on 144.90 MHz, at the next *IARU* Region 1 conference. According to an item in *DUBUS Magazine* 4/85, their Council passed this resolution at a convention last October. The reason was to accommodate more local FM channels in Germany. At least 85 2m. beacons are listed, 37% of them outside the existing 144.845 to 144.990 MHz allocation.

It is nonsense to expect so many useful beacons to be crammed into 20 kHz even if some time sharing is considered, as happens on 20m. Nevertheless, maybe we should ask if more efficient use could be made of the beacon band. With intelligent planning, adopting a 2½ kHz "channel"



New from Amcomm/A.R.E. is the Amcomm 9000 ATU, shown here. The unit, which is a development of the Amcomm 300, incorporates a 1:4 balun to allow connection of the transmitter to the antenna via 300-ohm balanced feeder, and utilises a capacitively tuned 'T' network for matching high or low impedance antennas to low impedance transmitter outputs. The Amcomm 9000 is general coverage and tunes over the range 1.7 to 30 MHz, and components in the unit are rated for operation with power outputs of 100 watts. Price of the Amcomm 9000 is £89.00. For more information contact Amcomm/A.R.E., 373 Uxbridge Road, Acton, London W3 9RN. (Tel: 01-992 5765/6).

spacing, all listed beacons could be accommodated with only two sharing any frequency in a 100 kHz bandwidth. As for the DARC's reason for reducing the beacon band, is it not about time they, and all other national societies, got their act together and plan a more efficient use of the FM section? We can no longer afford the luxury of 25 kHz channel spacing which encourages excessive deviation levels. Have they never heard of narrowband FM? After all, radio amateurs are concerned with reasonable communication voice quality, not hi-fi FM broadcasting. The place for that is 23cm. and above, where most of the bands are unused, not the overcrowded 2m. band.

Awards News

Only one award has been issued this past month, a 144 MHz VHF Century Club certificate no. 381 to Mike Newell, G1HGD, from Kenilworth in Warwickshire, on March 14. He is 18 years old and was licensed in August, 1984, but was first fired with enthusiasm when he was seven on seeing a general coverage receiver in a *Tandy* catalogue. His station consists of a Yaesu FT-290R and Tokyo 30W amplifier. A *Gasfet* preamplifier is used and the HB9CV antenna is in the loft. Mike also runs 70cm. using an Icom IC-490E at 10W to a 9-ele. Yagi in the loft. He plans to get his Class A licence when time permits and would also like to use the Oscar-10 satellite.

Ceri Jones, GW1JCB, has sent us a sample of a rather nice certificate entitled, "Vale of Glamorgan Amateur Radio Award". This award requires claimants working four stations in the Vale of Glamorgan after Jan. 1, 1985, on any band and by any mode except via repeaters. Log entries should be submitted and cost is

£1.80. Further details from GW1JCB at 7, Dawan Close, Barry, S. Glamorgan, CF6 8PZ, on receipt of an s.a.e.

Space News

The following notes have been compiled from recent *UoSAT Bulletins*, which in turn get information from various sources. First the new Soviet space station *Mir* which has been seen in the U.S.A. as a first magnitude brightness object like the stars in Orion's belt. The *Keplerian* elements for March 19 were inclination 51.6256°, period 91.237 mins., apogee 339.390 kms., perigee 332.390 kms., RAAN 335.4476°, mean anomaly 175.3822° and semi-major axis 6,713.889 kms. The Cosmonauts use frequencies of 142.42 MHz and 922.75 MHz and 150.0 MHz is used for docking operations. Other narrowband FM *Mir* transmissions have been reported between 142 and 144 MHz.

Until the last week in May, the Soviet *RS-5* and *RS-7* satellites will be in full sunlight again and, if the batteries hold out, they could be on full time. From June until the first week in August, they will be in an eclipse period once more with curtailed operation. Under heavy load in eclipse periods, these spacecraft command themselves off when battery under-voltage is sensed; they can only be commanded back on by ground stations in the U.S.S.R.

Next *AMSAT* and news of steady progress on many aspects of *Phase 3C* spacecraft at the organisation's laboratory in Golden, Colorado. Most of the niggling mechanical problems of components not quite fitting have been solved. The thermal vacuum testing, scheduled to begin on May 23, may include a try-out of the transponders as *Martin-Marietta*, the company doing the testing, has given permission for the satellite to radiate during the test.

AMSAT-USA and *AMSAT-DL* will make the final decision on this.

No reader reports on *O-10* this month. Those interested in satellite SSTV are advised that an *ad hoc* calling frequency exists on Mode B, 145.888 MHz. This snippet from W8KZM, *AMSAT*'s SSTV adviser.

Finally to *AMSAT-UK* and a reminder about its Colloquium at the *University of Surrey* on July 5/6. Originally intended for *AMSAT* members only, this event is now open to *RSGB* members. All bookings must be confirmed by the end of May. *AMSAT* members should use the booking form in *Oscar News* No. 57; *RSGB* members should write immediately to Ron Broadbent, G3AAJ, the Secretary, at 94 Herongate Road, London, E12 5EQ, enclosing an *s.a.e.* and marking their envelope "Colloquium" in the top left corner. July 5/6 is VHF NFD weekend, which might preclude some from attending. Also your scribe will be busy with the August VHFB editing that weekend.

News from 4U1ITU

Geoff Grayer, G3NAQ, wrote from Geneva on March 2 but his letter arrived after the April deadline. He operated 4U1ITU in the Dec. 16/17 tropo. lift and worked 19 PAs, 3 LXs, 2 ONs and 6 Ds, followed by his old friend and ex-neighbour G3NVO at 2252, then G4DCV, G3KPV, G4ASR, G4SWX, GW4LXO, GD4GNH for the first 4U1/GD contact direct on 2m., G4RRA, G3TA, GW8JLY, G3PBV, G6YXT, G8NR, G4DOL, but the QSO with G4UXC was incomplete. G4SSO, G0CHE heard but QSO incomplete. The band "died" at 0110. G3NVO was contacted on 70cm. for a first 4U1/G on that band.

4U1ITU has been active on *E-M-E* mode, the station comprising a modified *Kenwood TS-700S*, *Polar Developments* 100W PA, *Henry Tempo* 6N2 PA giving one kilowatt output and an S3030 *Gasfet* masthead preamp. The antenna array is four 19-ele *Cushcraft* Boomers fed with *Andrews* $\frac{1}{2}$ inch diameter coax via a home made phasing harness using CK50 cable. This array is mounted on a 6m. *Western Electronics (UK)* tower with azimuth control by a *Ham II* rotator and elevation control by a *KR500*. A *Microlog ACT-1* automatic morse sender completes the station.

Geoff reports the Autumn ARRL *E-M-E* contest as disappointing with only seven stations worked, the only new one being OH7PI. Recent skeds with WA1JXN/C6A and G4DGU were unsuccessful, but VK5MC was heard during the February European window. Although G3PIA has been heard, 4U1ITU has yet to work G via the Moon. As he is definitely returning to England in June, Geoff advises those wanting skeds to contact him right away c/o EP Division,

CERN, CH-1211 Geneva 23, Switzerland. His daytime 'phone no. is 010 41 22 833429 and the evening one in France is 010 33 50 412638. On 2m. *E-M-E* 30 stations in 12 countries, 10 U.S. states, 10 Maidenhead fields and 29 QTH squares have been worked. Once Geoff returns to England, he doubts there will be much serious activity from 4U1ITU as the 2m. PA will come back with him.

Six Metres

Ken Ellis, G5KW, passed on a letter from Lefty Clement, K1TOL, (Maine) dated March 10 and covering the *Aurora* of Feb. 8/9. He was first to hear the Anglesey beacon GB3SIX at 2300 and at least three or four others on the east coast heard it up to 0100. Signals were 539 via *Auroral Es* for 15 – 20 mins. at a time. He called "CQ" for ages switching between 50.110 and 50.099 MHz every 30 secs. but got no replies. However, he has received a letter from SM6PU who did hear his calls for 10 – 15 mins. at around 0050. Lefty also copied GB3NHQ very weakly, 2345 – 2355.

K1TOL says it is very important to listen to the west after a normal *Ar* for multi-hop *Auroral Es* signals. He has often worked over to W7, VE7, VE8 and KL7 on an apparently dead band by this mode. He finds that these long haul *Ar-Es* openings always occur late at night local time, the signals being very strong and echo-like, similar to F2 back-scatter. He is certain that many people miss these excellent openings because they think the band has gone dead after a normal *Ar*.

K1TOL uses a *Drake TR-6* and a kilowatt amplifier, with a *Cushcraft Boomer* antenna at 37ft. atop a 500ft. hill. So there is a very big *e.r.p.* difference when compared to our very restricted level. He reckons that from mid-May, when the 6m. *Es* season usually starts, many antennas in North America will be pointing to Europe rather than to the south or west. He mentions the large number of beacons operating in the 50.050 to 50.080 MHz region, so that CW activity is usually around 50.085 to 50.105 MHz. He thinks we should hear K1NFE (Conn.) on 50.060; W2CAP/1 (Mass.) on 50.069; WA2YTM (NY) on 50.070 and VE2STL (Quebec City) on 50.075 MHz in the summer. Finally, Lefty says that W6JKV is planning a 6m. expedition to Europe or West Africa sometime in late June or early July.

Tony Collett, G4NBS, waiting for the repeat of the Feb. *Ar* which happened on Mar. 6. The only signal found was GM3ZBE who was easily worked from Cambridge. Steve Black, G4PSS, (TWR) uses a *Yaesu FT-680R* and a *Tono 5-ele.*, *Yagi* pointing SSW, 30ft. *a.g.l.* from his site 550ft. *a.s.l.* He suffers from pulse type QRM from mid-afternoon and which can last for several hours. "Local" stations worked in the first half of March were

G3XXQ, G4s, HPS, IZH, MSF, RNI, WJV, WVI, XWR. More distant QSOs were with G4IJM (CVE), G3GXQ and G3WNR (YSW), G2ADR (YSN),

G4WAD (HWR), G0EBB (YSS), G5UM and G3OUT (LEC), G6NB (BKS), G3FGT (WMD) and GW3LDH (CWD). Steve wonders what frequencies have been specified for RTTY and SSTV on 6m. As far as is known, none. With such low activity, what would be the point? The obvious ploy would be to call "CQ" on the SSB calling QRG stating you are looking for RTTY, or whatever, QSOs and then move off anywhere convenient.

John Jennings, G4VOZ, (LEC) worked GW3MHW on Mar. 1 and tried the QSO on 4m. as well, but there was not much to choose between the two bands, although QSB was worse on 6m. While he can always copy John on 4m., on 6m. the signals often drop out completely. On the 18th, he contacted GW4HBK on CW at RST 529 at best, no better than on 4m. Back to the Feb. 8 *Ar* and John Palfrey, G4XEN, (NHM) reports QSOs with GM3ZBE (GRN) at 1249 and GM4YPZ (GRN) at 1254. John was running 4W to a dipole.

Dave Lewis, GW4HBK (GWT) sent along a sample of the nice GB4MTR QSL as he was using that call recently. On 6m. the distances worked were lower due to the low *e.r.p.*, best DX being GU2HML and G4VOZ, with GJ3YHU heard. So far the band has proved that it is much easier to work stations via MS and *Ar* than it is on 2m. However, tropo. propagation is much poorer. For example, G4FRX in Hampstead regularly works G4OAE in Reading on 70cm. using a few watts, signals being rock steady and very strong. But on 6m. signals are quite weak and always accompanied by lots of noise, even though the distance is only about 50 kms. and both stations are well sited with a relatively clear path. The general conclusion is that 6m. is the noisiest VHF band with thermostat and motor commutator hash, and all the domestic clicks and bangs peaking around 50 MHz. Perhaps this explains why so few stations are using the band now that the initial novelty has worn off.

Four Metres

G4VOZ has not been able to operate so much lately but John reports QSOs with G3MPN (NOR) on CW on Mar. 12, G4RDT (IOW) on the 13th, the strongest yet this year, GB4MTR (GWT) on CW but not very strong, G4TGB/P (LCN) on SSB at 2008 on the 16th and G4WND/P (NLD) on SSB on the 30th. John heard the latter work several stations over 200 miles distant including G4FRO in Bristol. He says that G4TGB will be on again from Lincs. in May with a better station.

GW4HBK made 52 QSOs using the special GB4MTR callsign, 32 on SSB and 20 on CW. Dave's best DX were G3VIP (HBS), G3OIT (ESX) and a half contact with G4UVA (NOR). All the QSLs have been written out and presumably sent off to the bureau. The GB4MTR call was down to be

used by G4VIX (HFD) from Apr. 23 to May 20, then by G4ASR (HWR) from May 21 to June 17. Steve Black, G4PSS, says he will be active again on the band from Tyne and Wear as soon as he can find the time to erect the antenna.

Two Metres

Mike Honeywell, G0ABB, (HPH) has added 32 more stations to his CW ladder total in March. It is encouraging to see several recent Class A licensees among the calls, such as G0EAQ, G0EBI, G0EBW and G0EKZ. European QSOs include DK3KD/P, DL0WU, ON6NH, ON7XC/A, PA3DYJ, PE11SH, PE1LBX/P and PI4DEC/P. Colin Morris, G0CUZ, (WMD) comments on the poor conditions in March, the only notable QSO being with G0AEA (IOS) in WJ square on the 11th. His main interest now is CW MS and he reports completed contacts with OK1KT (HK) on the 5th; EA3DXU (BB) on the 7th; OE3OKS (IH) on the 19th; YU3HUL (HG) on the 28th who was using 100W to a 15-ele. *Yagi* and which produced a 2 secs. burst at S9, 5s. at S4, and near the end a 50s. burst; DL4MDQ (FI) on the 31st and EA6VQ (BZ) the same day.

Dave Ackrill, G0DJA (WMD) is still running 2½ W of CW using either a 30m. long wire or rhombic antenna. The latter should favour the north but seems to be quite effective to the south as well. John Acton, G1DOX (CBA) did not manage any continental DX in March. His new counties for table points include G1JGS/P (IOW), G1EZS (HPH), GW1MNC (GNM), GW6TEO (DFD), G1GUN/P (DOR), GW6GNE (GNS), GM1MFD (LTH) and GM4ZUK/A (GRN).

Bob Nixon, G1KDF, (LNH) has changed his station around and now uses a *Trio* TS-780 for 2m. He caught the repeat *Ar* on Mar. 6 and from 1630–1645 heard GM6TKS (WIL) and GM1IPQ (IO76KU). Between 1800 and 1930 he worked GM6TKS and heard OY9JD at S9 but he was only working GMs. Better luck for Bob later when he did work OY9JD at 2315 during the final phase from 2300 to 0010, to give a new square, WV, and country. Other QSOs were with GM8TUS, GM8MJV and GM0AVR (SLD). On Mar. 31 there was a 1½ hour EI/GI contest with good activity and an

ANNUAL VHF/UHF TABLE

January to December 1986

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G1KDF	—	—	83	14	50	6	14	3	170
G4NBS	—	—	49	14	45	7	8	2	125
G1DOX	—	—	57	7	34	4	12	2	116
G4WXX	—	—	79	14	—	—	—	—	93
G3FPK	—	—	69	14	—	—	—	—	83
G6HKM	—	—	49	10	18	3	—	—	80
G0CUZ	—	—	43	16	16	2	—	—	77
G4SEU	31	3	14	3	23	2	—	—	76
G4MUT	19	1	25	6	17	3	2	1	71
G4VOZ	34	3	—	—	28	2	—	—	67
G6XRK	—	—	58	9	—	—	—	—	67
G6OKU	—	—	31	5	18	1	—	—	55
G4YCD	—	—	35	3	9	2	—	—	49
G8XTJ	—	—	39	6	—	—	—	—	45
G4TGK	—	—	37	7	—	—	—	—	44
G4YIR	—	—	37	6	—	—	—	—	43
GW6VZW	—	—	37	6	—	—	—	—	43
G1PDW	—	—	36	5	—	—	—	—	41
G4DEZ	—	—	24	8	—	—	4	1	37
GW4HBK	30	3	—	—	—	—	—	—	33
G6AJE	—	—	3	1	22	1	—	—	27
G1HGD	—	—	10	2	11	2	—	—	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.

all-time new county, Leix, thanks to EI8FV/P who activated Offaly in NFD last year.

Ian Rose, G1PDW, (ESX) did not come across any lifts in March but did hear G0AEA in the Scillies. Jim Challenger, G4EIB, (WMD) finds he does best to the north and made his first QSO with G14OMK in Belfast on CW. He is now at 68 different stations worked on the key this year. In the Mar. 1/2 contest, G4NBS's only noteworthy QSO on the Saturday from Cambridge was GD4IOM but on the Sunday morning, Tony found a lift to the east and worked DK0RD (JO31/DL), DB0EI (JO30/DK), two ONs and 6 PAs, one in DN being a new square. In the afternoon he turned the beam north and worked GM4ZUK/A, GM6LNM, GM4FKD, GI8HXY in WO for another new square, GI6ATZ, and GM0BQM/P just after the contest. In all he made 63 QSOs. In the Mar. 6 Ar, the only station worked was GM4UFD (ZR) at 1915, QTE 10° for another new square.

Graham Jarrett, G4PPV, (KNT) has added 38 new CW stations between Feb. 3 and Mar. 21, all Gs apart from F6FLB and FC1PLQ/P, to bring his 1986 score to 63. Ray Baker, G4SFY, (NOR) describes the return of the Feb. Ar as a non-event. He first heard Ar signals at 1845 on Mar. 6 following a tip-off by G4DCV, but only weak GMs were heard up to 1852. In another ten minute phase from 2354, only weak GMs were heard, but nothing worked. On the 7th, while listening for any Ar signals from the DL0PR beacon on 144.910 MHz, it came out of the noise at 1247 remaining audible on tropo. for most of the afternoon, peaking at S2 at 1324. On Mar. 8, in the MS activity period, seven pings and four bursts, the longest for 2 secs., were heard, but too weakly to copy anything. On the 9th, Ray worked LX2GB (CJ) at 1401 on CW but for the rest of the

month, only the usual PAs and DLs were contacted.

Jack Charnock, G4WXX, (MCH) found GB2SCI (WQ) on the Isle of Iona for an unusual one. On Mar. 10 he lists EI4GA (Louth) and GW6XOA (DFD) the next day. He caught the EI/GI contest on the 31st and contacted EI4GA/P (Cavan), EI9FE (Tipperary), EI5FK/P (Cork), EI8FV/P (Leix or Laois) for an all-time new one, and GI4SXV (TYR). What a pity nobody mentioned this Irish contest, though.

G4XEN admits to being totally committed to the Maidenhead Locator system so all his reports use such as JO45 instead of the more familiar EP. As he had not written for some time, he listed the best of his extensive DX worked in the Feb. Ar, some 18 in all, between 1244 and 0145 when he went to bed on the 9th. John's longest Ar DX so far was OH5LK (KP30) at 1,927 kms. worked with the beam at 20° but the OH pointing due west. The pick-of-the-bunch included UP1BWR (KO24), SM1MKY (JO97), RQ2GAG (KO26), UQ2GAJ (KO16) and SP5AD (KO02). All these were worked at QTE 20–45° but four LAs in JO40, 49 and 59 were worked at 340°. For the record, John's best DX on the various modes in addition to the Ar one, are tropo. UP2BEA 1,586 kms., MS SM2CEW 1,950 kms. and Es 9H1BT 2,181 kms.

On Mar. 6, G4XEN found an Ar event between 1646 and 2030 and worked the following:- 1805 GM4YPZ QTE 15°, QTE/A 60°, 1819 GM6TKS 10°, 1912 LA9FY 350° and at 1936 GM4DGT. On the 7th at 1620, John thought he could hear a weak Ar signal on CW so called "CQ" beaming 10° but with no luck. Later, G3XBY reported hearing him at tone A, though. June Charles, G4YIR, (ESX) found it a bit of a struggle on the key and managed 22 more QSOs and six more

Station	ANNUAL CW LADDER				
	4m.	2m.	70cm	μWave	Points
G4SFY	—	130	—	—	130
G0ABB	—	114	—	—	114
G4XUM	—	105	—	—	105
G4YIR	—	105	—	—	105
G4OUT	—	75	—	—	75
G4EIB	—	68	—	—	68
G4PPV	—	63	—	—	63
G4AGQ	—	60	1	—	61
G0DJA	—	54	—	—	54
G4ZVS	—	50	—	—	50
G4TJE	—	26	—	—	26
GW4HBK	25	—	—	—	25
G2DHV	1	14	—	—	15

No. of different stations worked since Jan. 1.

1986 counties. Due to the gales, her beam was pointed in one direction for a lot of the time.

Colin Ford, G4ZVS, (WMD) has moved since he last wrote in 1985 and was prompted to write after working G4YIR. He joins the CW Ladder with 50, 45 of them using a little HB9CV antenna. He now uses 14-ele. *Yagi*, the transceiver being the *Yaesu FT-290R* with a 30W amplifier, so is hoping for better DX this year. Keith Killigrew's, G6DZH, (HWR) letter just missed last month's deadline. He missed most of the Feb. *Ar* but mentions QSOs with GM3JIJ (WS) and GM4SUF (XR).

Ela Martyr, G6HKM, (ESX) wrote the day after the gales on Mar. 24 but reported no antenna damage even though some of the gusts were of frightening velocity. After the excitement of the Feb. *Ar*, she found the bands very quiet but did add eight more counties plus France to her Annual VHF/UHF Table tally. Paul Baker, GW6VZW, (GWT) has worked Cambridge at last, after 18 months, thanks to G6AGG. Among other new ones for the table were GU2FRO (SRK), GUs 4HUY, 4WRP and 6EFB (GUR) and GOAHO (NOR). A few ONs and French coastal stations were heard weakly, but none worked. Paul summed it all up as "... poor conditions, vicious QSB, terrible wind, rain, sleet and snow conditions and lack of activity."

As observed from G3FPK, conditions have been quite appalling most of the time. It was a struggle to work GM3WCS (FFE) on SSB/CW on Mar. 16, not helped by the high noise level at Ken's QTH, and G4OPH (DWN) on SSB on the 18th. The *Barking Club's* contest on Apr. 6 saw reasonable activity but there was almost constant static rain and snow in the London area, registering S9. The noise blower in the *Icom IC-730* when switched to wideband "Woodpecker" mode, kills such noise completely, but very strong signals 20 kHz away cause distortion in the IF stages which sound as if the station is splattering badly, so we are back to square one. Some brave souls were out portable in blizzard conditions so we hope they were not marooned up a mountain.

Seventy Centimetres

G1DOX reckons this band to have been the best this month and John got seven counties and another country for the table. He lists:- G6HV (DVN) on Feb. 24, G8HHI (PHH) on Mar. 6, G6MKC (SRY) on the 11th, G6ATW (HFD) on the 12th, G4RDT (IOW) on the 13th, G4HXU (OFE) on the 15th, and GM6YQS (DGL) on the 17th. G1KDF has only been using 10W and is pleased with the reports he has been getting. Bob made contact with GM4YPZ (GRN) on Mar. 13, G8HHI on the 14th, G4RDT on the 15th and G14SXV (TYR) on the 31st.

G4XEN made his first ever *Ar* QSOs on

70cm. in the Feb. 8 event. These were G4XOL (IO83), G3LQR (JO02), GI4GVS (IO74), G4FUF (JO01), G4LOJ (JO02), SM6EUP (JO57), PA0WWM (JO22), DJ9BV (JO43) and DF5LQ, the QTEs being between 25 and 50°. John now has 84 squares worked on the band and his best tropo. DX is OK1KHI/P at 1,147 kms. and SM6EUP at 1,003 kms. via Ar. G6HKM added Cheshire, Devon, London, Gwent and Oxford to her counties score, the Welsh one being Ela's third 1986 country.

During the Mar. 1/2 contest, G4NBS made 29 QSOs, mostly on CW because a throat infection had left Tony with a rather croaky voice. He was only running 50W through 60ft. of lossy UR67 feeder but thought conditions better than on 2m. but that activity was very low. On the Saturday, he managed PA0EZ (JO22), ON4ALC (JO11), PE0MAR/P and PA3BPC/P in JO21. On the Sunday, he worked PE1GHG (JO21), PE1EWR (JO11), DL2KBB (JO30), DK0VS/P (JN39) on CW, GD4GNH and GI6ATZ. On the 12th he contacted G1DYG (WLT) and on the 13th G8LPY (SXW).

The Microwaves

G0DJA reports that some of the locals were out portable on Mar. 30 on 3cm. even though it snowed hard in the morning. Dave and Frank Breedon, G3MZU, went over to Walton Hill in Clent, which is between Stourbridge and Bromsgrove, and worked Glen Ross, G8MWR, 48 kms. away on Larkstoke. But they had flat battery problems. G3MZU has only just built his 3cm. gear and has not yet got a dish antenna fixed up. Dave was hoping to be out -/P on Apr. 13 for the first *Microwave* contest of the season and might have had some 24 GHz gear running by then.

From Cumbria, G1DOX has fired up his 13cm. gear and has detected a carrier from G3KFD (WMD) who could just about hear John in the noise. G3WOH in Liverpool detected G1DOX too, but Eric was RS53-4 in Holbeck. He hopes to have some more power soon. On 23cm. he has made his usual contacts into the Wolverhampton area and also managed a couple of new 1986 counties; G0CZD (SPE) on Mar. 6 and G4CBW (SFD). He now has AM, YL, YM, YN and ZL squares worked.

G1KDF now uses his *Trio TR-9130* to drive his 23cm. transverter. Bob reports QSOs with G18AYZ (ATN) on Mar. 7, G6ADE (YSS) on the 12th, G8GXP (YSW) on the 22nd and G14CXH/P (DWN) on the 29th. He failed with G4KLX (DYS), G8HHI (PHH), G8WFKB (GDD) and GM4YPZ (GRN). G4NBS went to the VHF Convention and bought most of the parts he needed for his two times 2C39 amplifier, except for the valves. On Mar. 2 he worked PE0MAR/P and PE1GHG, both in CL, for a new

square, and PE1EWR again after a bit of a struggle on SSB. On the 15th Tony worked G6DER again.

Contest News

The 432 MHz to 24 GHz Contest is on May 3/4 from 1400 for 24 hours; see page 64 of last month's VHFB. Entries go to G4NBS at 10 Quince Road, The Limes, Hardwick, Cambridge, CB3 7XJ. The 144 MHz and s.w.l. contest is on May 17/18 from 1400 to 1400 and there are three sections; Single-op., Multi-op. and listener. They have fiddled with the scoring again. This time it is the familiar radial ring total times a multiplier. The multiplier is the total of administrative counties plus countries. Because the Scottish regions are so large, if you work three stations in Strathclyde, for example, you can count three multipliers but if you work, say, six, it will still only be a maximum of three you can count.

May 31 sees the 1,296 MHz Trophy Contest from 1600 to 2400 and this is a two section event, Fixed and All-other stations. On June 1, the 432 MHz Trophy and s.w.l. affair is scheduled for 0900 to 1700 and there are three sections, Fixed, All-other and Listener. The second leg of the 10 GHz *Cumulatives* is on May 11, 0900-2000 and it coincides with the second session of the *Microwave Cumulatives*, the favoured band being 5.7 GHz.

Scandinavian Meeting

This year the Annual Scandinavian VHF/UHF Meeting will be held in Norway over the weekend June 6-9 at Geilo. The *Hallingdal ARS* is organising this as far as lodging, premises and food are concerned, the *Asker and Baerum ARS* arranging the technical programme. The meeting will take place at the Solli Tourist Centre and there is accommodation for about 400 people in the Geilo Apartments which are very well appointed. Some very interesting talks and demonstrations are listed. Bookings for accommodation had to be in by May 1 so anyone interested had better telephone Lars Breie, LA9BM, whose telephone no. from Britain is 010 47 42 87178 and his QTH is; LA9BM, Lars Breie, N-3580 Geilo, Norway. Pity this weekend is at the peak of the *E*'s season, though.

Finale

Let's hope that May will see both warmer weather, so we can do some antenna engineering, and some better radio conditions. The deadlines are in the box and all your contributions should be sent to; "VHF BANDS," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

A Stable VFO on PCB

IAN KEYSER, G3ROO

IN Colin Turner's (G3VTT) article in *Short Wave Magazine* for February 1985, he outlined a method of VFO construction that allowed a constructor to revert to the older, well tried and tested techniques of tagstrip construction. I thought about trying Colin's circuit but constructed on PCB.

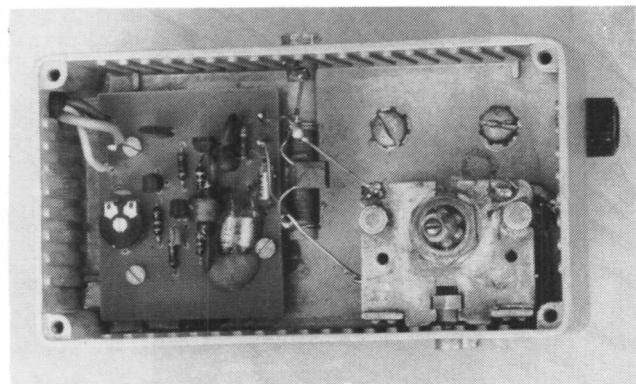
Colin's arguments about VFO stability, or lack of it, due to the PCB flexing, whilst valid can be overcome if attention is paid to PCB mechanical vibration and components quality. Working with Dick, G2ACG, I have come up with the following arrangement which can be duplicated with ease and provides good stability providing care is taken with mechanical layout.

To recap: Colin asserts that tagstrips are intrinsically stable and with the components mounted in the centre of the box any vibration would not have too severe an effect on capacities, as when a component moves away from one wall of the box, so reducing the capacity to that wall, it will move nearer the other side and the capacity to that wall will increase — giving the overall effect of little change. His argument against PCB is that this is mounted near to the box surface and so any variation causes a large variation in capacity. I do agree with his arguments but disagree with the amount of variation. As components are mounted very close to the PCB surface they are almost unable to move, and as far as the PCB flexing is concerned, it is a very simple matter to mount the board within the box very firmly indeed.

The Tests

Dick, G2ACG, built a tagstrip-constructed VFO and obtained good mechanical stability. The thermal stability was extremely poor indeed and the main offender turned out to be the gate diode included in Colin's design. With this removed it proved fairly easy to get reasonable thermal stability by changing the mica/ceramic capacitor ratio. The final figure obtained at 9 MHz was an overnight cool off drift of 200 Hertz. On turn on this was soon compensated for as the components reached their working temperature and then drift was never more than 10 Hz per hour and slowly cycling up and down.

I then constructed a similar design on glass PCB using mica capacitors; the circuit is shown in Fig. 1, and the PCB layout in Figs. 2 and 3. I have altered Colin's design as I wished to have a



Inside the VFO box.

greater output level and facility to vary the level. My test frequency was 5 MHz but I could not approach the figures obtained by Dick. I then changed the input capacitors to polystyrene and immediately obtained comparable figures. This is not really surprising as my test frequency is considerably lower than G2ACG's, however the ease by which it was obtained was exceptional. By physically 'belting' the box I could not get more than a slight dither in the frequency except when the tuning shaft was shifted due to too much enthusiasm!

The Circuit

TR1, a 2N3819 FET, is used in a conventional Colpitts circuit; there is absolutely nothing unusual about the design except the usual clamp diode is omitted for the sake of stability. The supply

Table of Values

Fig. 1

R1 = 68K	C2 = 260pF poly
R2 = 4K7	C3, C4 = 680pF poly
R3 = 47K	C5, C7, C9 = 0.1μF ceramic
R4 = 100R	C6 = 22 pF ceramic
R5 = 1K	C8, C10 = 0.01μF ceramic
R6 = 10K	TR1 = 2N3819 or similar
RV1 = 220R horizontal preset	TR2, TR3 = BC183 or similar
RFC = 1mH miniature RF choke	Reg = 78L05 or 78L06
C1 = 100pF ceramic NPO	VC1 = see text
<i>Note:</i> all resistors are 1/4-watt.	

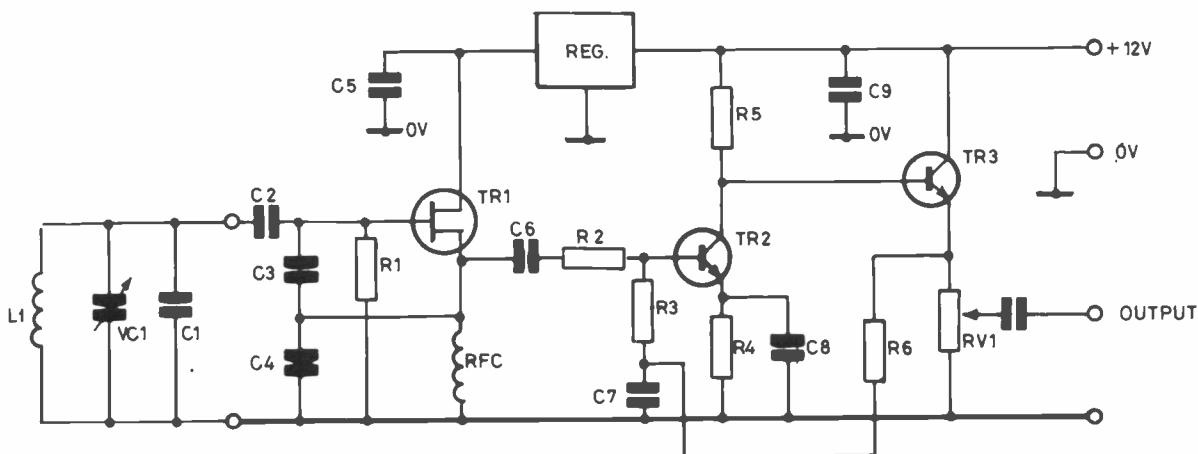


Fig. 1 CIRCUIT DIAGRAM

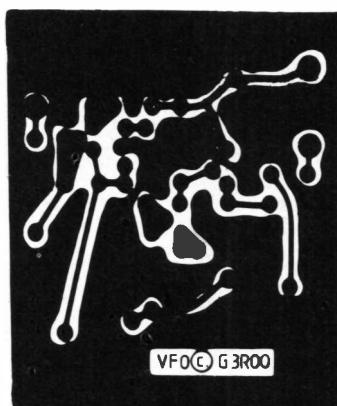


Fig. 2 PCB LAYOUT

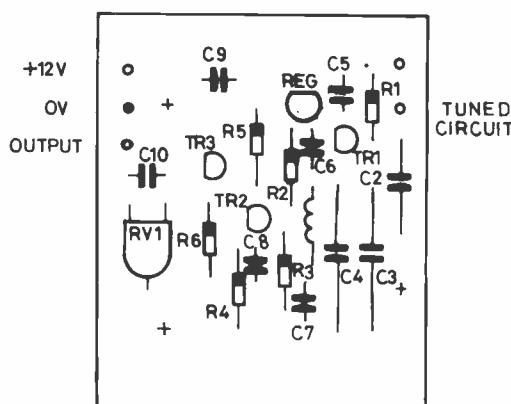


Fig. 3 COMPONENT LAYOUT

to the oscillator is stabilised by a 78L05 regulator. This is a small transistor-style package which lends itself very well to applications like this due to its relatively low output noise level and low internal consumption, keeping heat generated to a minimum. The two stage DC coupled amplifier formed by TR2 and TR3 again is a straightforward wideband circuit, but the DC coupling and the DC feedback has the ability to cope with large variations of transistor parameters. No RF negative feedback is included so that maximum gain is achieved. Resistor R3 is included as a simple attenuator, and after construction this can be varied if necessary to adjust the output level. In practice it is best if RV1 is set at about three-quarter travel and R2 set for the required output. RV1 can

1.8 to 2.0 MHz:

C1 = 68pF
L1 = $\frac{1}{2}$ -inch dia. former with slug close-wound with 45 turns of 38 s.w.g. enamelled copper wire.

3.5 to 3.8 MHz:

C1 = 18pF
L1 = $\frac{1}{2}$ -inch dia. former with a slug close-wound with 20 turns of 26 s.w.g. enamelled copper wire.

5.0 to 5.5 MHz:

C1 = 100pF NPO
L1 = $\frac{1}{4}$ -inch dia. former without slug close-wound with 50 turns of 26 s.w.g. enamelled copper wire.

7.0 to 7.3 MHz:

C1 = 220pF
L1 = $\frac{1}{2}$ -inch dia. former with slug close-wound with 8 turns of 26 s.w.g. enamelled copper wire.

Table 1

be used at a later date if it is desirable to alter the drive for any reason.

Thermal Compensation

Fig. 4 and Fig. 5 show the short and long term drifts. The coil consists of 40 turns of 26 s.w.g. close-wound on a $\frac{1}{4}$ inch former. Experience has shown that ceramic formers are the best for VFO's, but the little Aladdin former has stood the test of time very well and can be used with great cost advantage.

The most common form of drift in VFOs is thermal, this manifests itself as a creep of frequency in one direction or the other as the temperature inside the box rises due to heat generated by the oscillator circuit. If the frequency drifts low this means that the overall capacity is increasing with an increase in temperature and so negative temperature coefficient capacitors are added in small amounts. It is of course necessary to reduce the existing capacity by the same amount of NTC capacity added, otherwise the frequency tuning range will suffer.

Compensation is a fairly hit-and-miss affair unless very careful note is made of the frequency change for given change in temperature. It is then possible to calculate total correction required. In the VFO detailed polystyrene capacitors were used in conjunction with a 100pF NPO ceramic capacitor and it can be seen from the graphs that very good stability has been obtained.

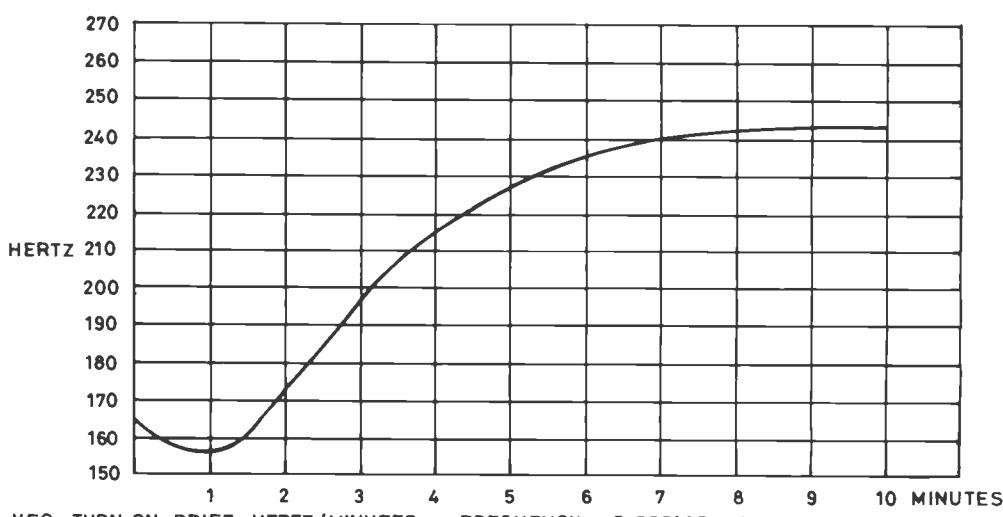


Fig. 4 VFO TURN-ON DRIFT HERTZ/MINUTES. FREQUENCY 5.555165 MHZ.

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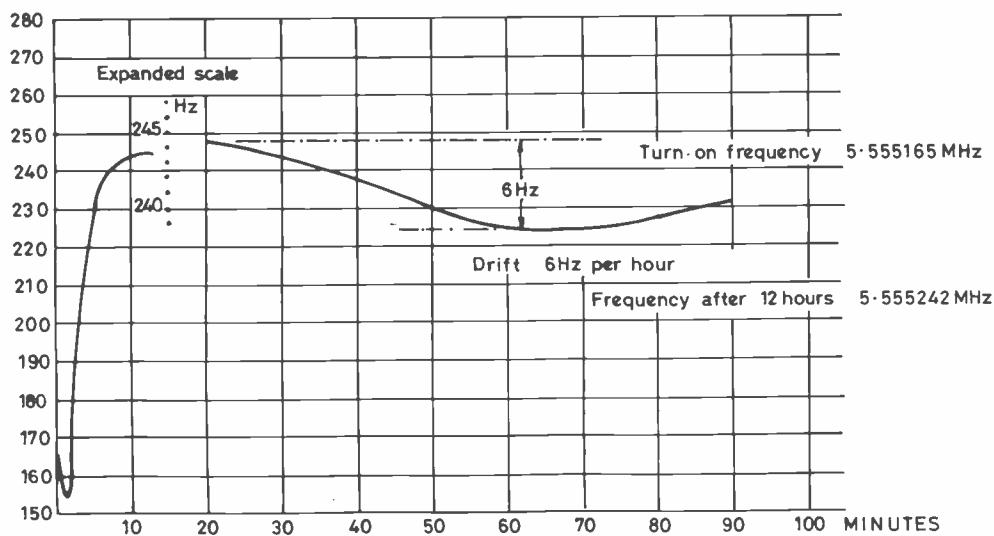
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Figure 5

Frequency Range

The VFO can be used on any frequency between 1.8 and 10 MHz with good stability. It would be possible if extra care were taken in the mechanical construction to use it on the 14 MHz band, but in my experience the work involved is so great that a crystal mixer VFO can be designed, tested and in use before the VFO is considered satisfactory.

To alter the frequency range it is necessary to change the inductor L1 and the value of the tuning capacitor VC1. Series and parallel fixed capacitors (C1) can be used with VC1 to change its

value rather than achieving this by removing plates. It must be remembered however that these capacitors are also liable to temperature variations and must be included in any calculations for compensation. Using a 75pF variable capacitor for VC1, Table I shows the inductors that can be used for a given frequency coverage.

Mechanical Construction

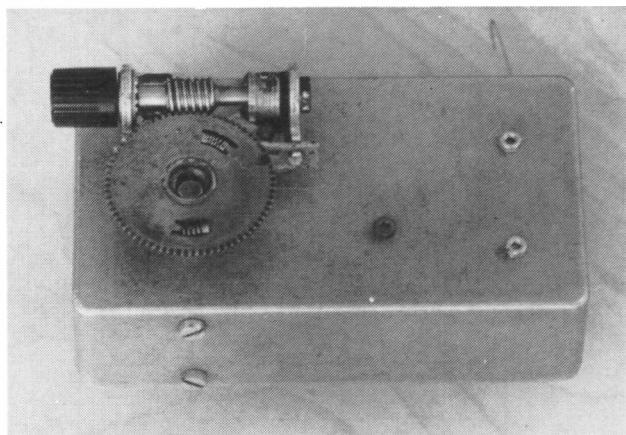
The box used to house the VFO is made from cast aluminium to increase the mechanical stability. If a normal box is used it is necessary to ensure that the corners are securely bolted and that the lid is tight fitting. In the case of the diecast box it is only necessary to ensure that the lid is a good fit. This may sound a little excessive as they 'feel' so firm, but the circulating currents in the surface of the box soon find a poor path and this can seriously effect the frequency stability. The first thing to do is to lightly tap the long sides of the box, slightly distorting it so that the lid is a push fit into the box, the sides will then be supported on the flanges of the lid. Then place the lid half over the edge of the table with the flat surface down. Apply a little pressure so that a very slight bend is made. Take care, a total bend of less than 1mm. is required but this will ensure that when the screws are tightened the centre of the lid will be in firm contact with the sides of the box.

The next, and often the biggest problem, is the slow motion dial. A good tuning rate for receivers is about 20 kHz per turn unless a very big knob is used. Over the years I have always been on the lookout for tuning drives and have several in the junk box. For the younger amateur this is not so easy, but junk sales should be followed very closely as they are a good source of supply. Failing that, epicyclic drives, two in tandem, can be very effective but considerable care must be taken in the mechanical support to maintain stability. It is also more difficult to fix a dial to these drives when two are used as it has to be connected to the capacitor spindle, the reason for this is that there is a certain amount of slip in the drives themselves which soon renders any calibration useless.

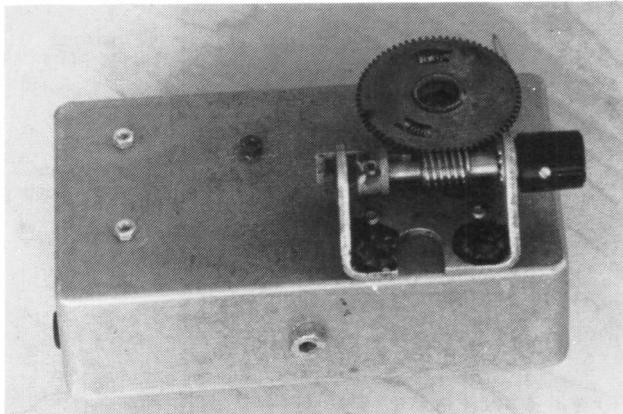
Conclusion

PCB's and basic components including the box are available as a kit but this excludes the variable capacitor and coil former as these are very expensive new and are usually available in your own or friends' junk boxes.

The price of the kit is £7.45 including postage and packing and is available from the author at "Rosenmount", Church Whitfield, Dover, Kent CT16 3HZ.



Above and below, a typical 'good' slow-motion drive mounted on the VFO box.



A Rotator Cage for Pipe Masts

PAUL WHATTON, G4DCV

THE author lives in a very exposed cliff-top location which is only about a mile from the sea. Whilst this is very nice for working DX on the VHF and UHF bands, it does mean that very high wind speeds are often experienced during the winter. A Stolle 250 rotator, renovated by the author after being thrown away by a friend, had done sterling service for three years despite being grossly overloaded. Finally, alas, the November gales proved too much, bending the stub mast, stripping the rotator's gears and making an expensive mess of the Heliax feeding the antennas. Father Christmas fortunately brought a new, heavier duty rotator and it was decided to increase the potency of the author's 2m. signal by stacking another 14-element Yagi. (G4YXY was heard to comment that only G4DCV would put up a bigger antenna after his last one had just fallen down!) The instructions suggested that a maximum of one metre of stub mast should be used unsupported above the rotator, so the head unit described here was made up.

The dimensions given are for the Daiwa 7500 and 7600 rotators although they could easily be adapted for any other make. Two 6" square plates of $\frac{3}{16}$ " thick steel form the top and bottom of the cage, with $\frac{1}{2}$ " angle for the verticals and a top bearing tube which is a slide fit around the stub mast. Diagonal braces of the same angle stock are welded to the cage in order to improve its rigidity (Fig. 1). The top plate has a 2" hole bored in the centre to take the mast (Fig. 2), in the author's case the corners of the plate were bent down slightly, although this is not essential. The bottom plate is drilled out to take the rotator, a pattern can be made by laying a piece of paper on the bottom of the rotator and rubbing

over the holes with a pencil (Fig. 3). It is very important that both the mounting holes and the large hole in the top plate allow the rotator and stub mast to sit centrally, so preventing any strain on the rotator casing as the antennas turn. The four $\frac{1}{2}$ " holes in the corners of the bottom plate are for the attachment of guy lines. The author uses shackles on the end of his guy ropes making it quick and easy to fasten them off and preventing them cutting through on the plate.

The whole cage took about an hour to weld together, the quality of the welds being very important. A visit to the local blacksmith is necessary if you are unable to use an arc welder or cannot persuade one of your friends with the required skill. (This method was used by the author; thanks John.) Once assembled the cage was given a thick coat of 'Galvafroid', although any good primer will do, and a top coat to prevent rusting. Possibly the hardest part of this sort of project is in finding the materials, though the sort of small quantities used here can usually be scrounged from engineering works; the author managed to acquire all the materials without dipping into his pocket! The top tube, with an inside dimension of 2" proved quite difficult, and special thanks are due to Ian, G3ROO, who went to considerable trouble to find it for me. Where he scrounged it from must, I'm afraid, remain a secret!

In use the bottom plate is sandwiched between the rotator and its mast clamp (Fig. 4). The supplied bolts were not long enough so new stainless steel ones were bought from a yacht chandler and cut down to the required length. If you have never tried to cut down stainless bolts before then I strongly recommend the

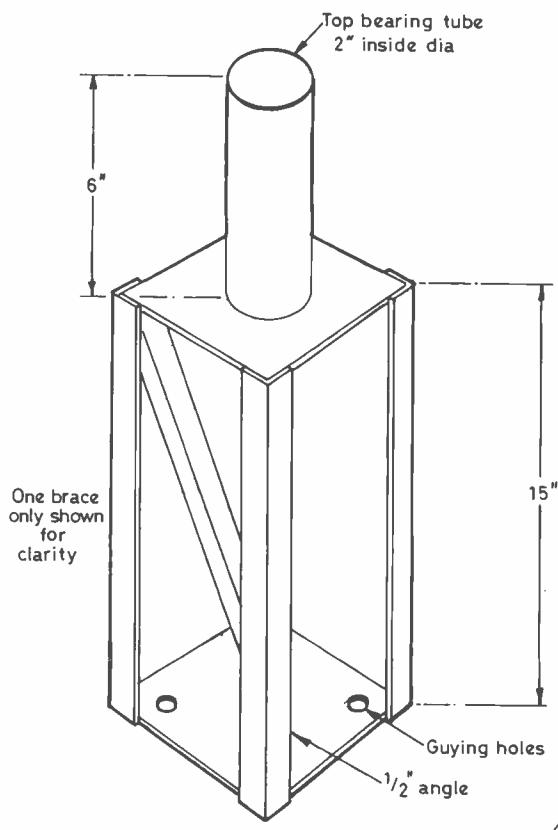


Fig. 1 ASSEMBLED CAGE

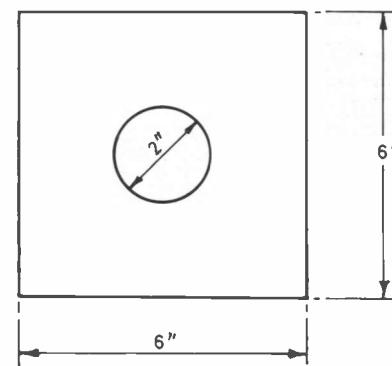


Fig. 2 TOP PLATE 3/16" Mild steel plate

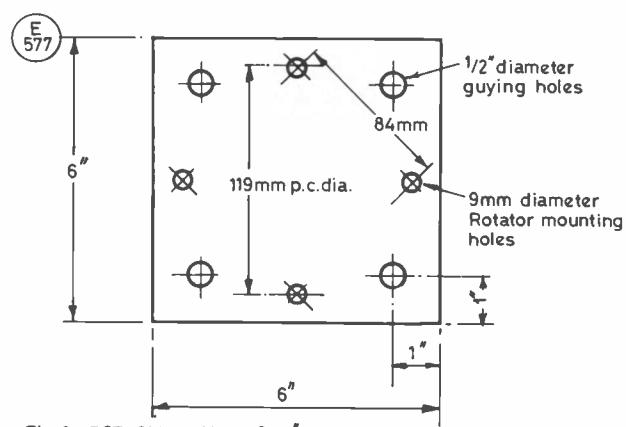


Fig. 3 BOTTOM PLATE 3/16" Mild steel plate (see text)

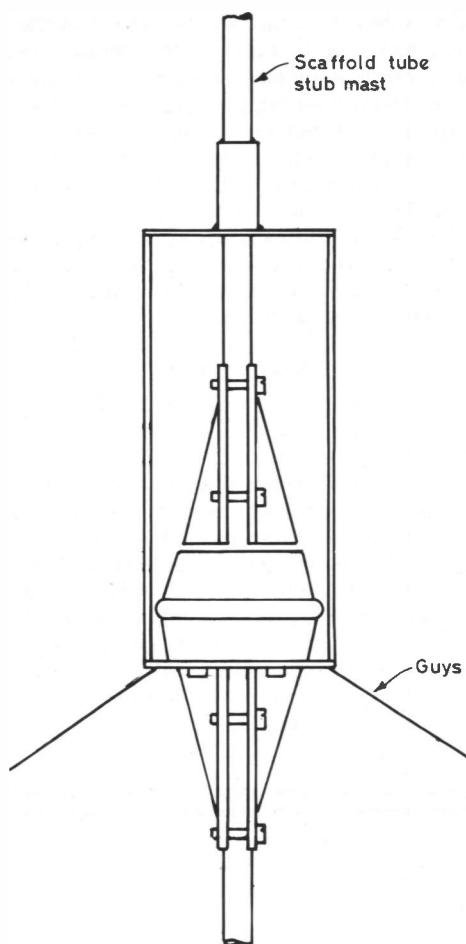
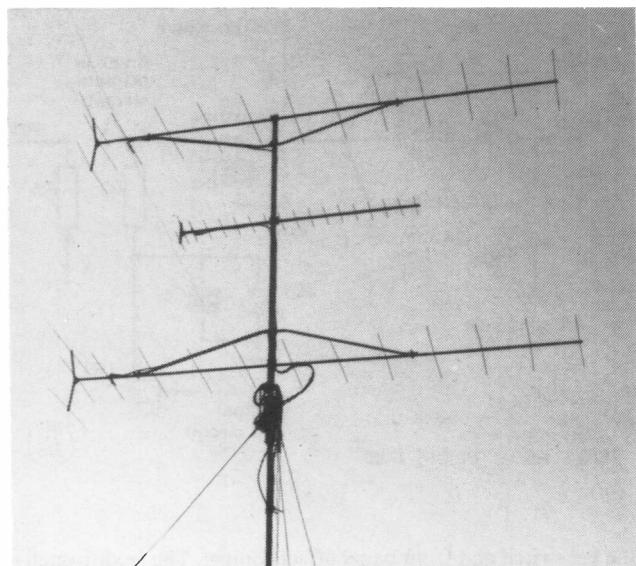


Fig. 4 Installation of Rotator

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The complete antenna installation, showing the author's two 14-element MET Yagis for 144 MHz with a 19-element for 70cm. mounted in the middle.

purchase of a couple of new hacksaw blades. The stub mast, which is standard aluminium scaffold pole, should be well greased where it passes through the bearing tube. Care should be taken when tightening everything up to ensure that the mast is central in the rotator. None of the dimensions, except the drilling of the top and bottom plates, are critical, and I would expect anyone building this to adapt the sizes to their own requirements.

At the end of the winter the antennas are still up there and G4DCV sleeps better at night: Thanks are due to G4BSW, G4XFL and G6RMA for getting out of bed on a cold Sunday morning to help haul it all up in the air.

More on the "TX80" Transmitter

a simpler way to 'park' the VFO

REV. G. C. DOBBS, G3RJV

THE TX80 Transmitter, described in the March and April 1986 issues of *S.W.M.* uses a free running VFO as a frequency source. This means that during receive periods, unless the VFO is switched off or moved in frequency, it becomes an interfering signal in the receiver passband. The original article describes an offset circuit to remove the VFO signal out of the receiver passband during receive periods. In fact a front panel control is included to set the frequency offset. This could be a useful control to have "up front" if the transmitter were to become part of a direct conversion transceiver.

This is an excellent, indeed the usual way of allowing the VFO to run the whole time. Switching a VFO on and off at every change from transmit to receive states is not advised because although this VFO circuit is stable, like most circuits, there is short term switch-on drift. It was Peter Linsley, G3PDL, who pointed out to me that several manufacturers of amateur radio equipment have an alternative "parking position" for VFO circuits. This is achieved

not by switching off the complete VFO circuit but reducing the voltage on the actual oscillating stage until oscillation just ceases: the stage is still conducting but not in oscillation. Because there is still current passing through the device, (the usual cause of short term, switch-on drift) heating effects at the junction, do not occur. A neat and simple idea which could be applied to the TX80.

Alternative VFO Parking Circuit

The circuit in Fig. 1 shows how this principle can be applied to the TX80 circuit. The right hand side of the diagram refers to components in the original VFO circuit diagram (page 12, March issue); TR1, ZD1, C5, R2 and R5 are already part of the VFO as built. The stage to be controlled is TR1 so the top end of R2 is lifted from the circuit board. Changes could be made to the circuit board but I simply lifted the lead at the top end of R2 and added the control circuits at that point. The original offset circuitry must also be removed from inside the VFO enclosure and from around

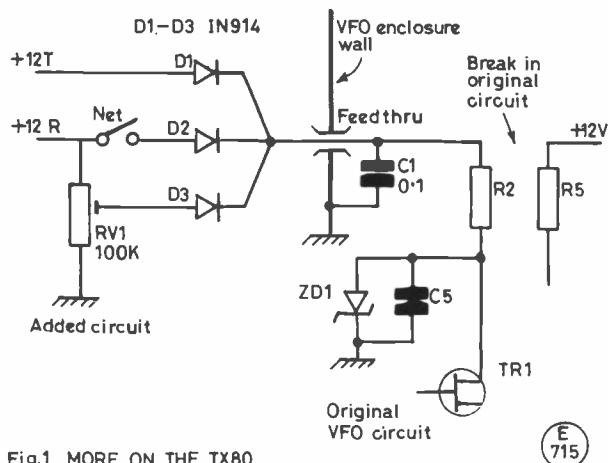


Fig.1 MORE ON THE TX80

the net switch and front panel offset control. The feedthrough at the rear of the VFO enclosure now becomes the input point for the various forms of supply voltage for TR1. I added a decoupling capacitor, C1, at the point where the feedthrough comes into the enclosure.

Three sources of supply voltage for TR1 are required. The oscillator must have 12 volts at the top of R2 during the transmit

periods, this comes from the 12v. 'T' line available from the changeover circuit board. During receive periods the voltage is reduced until oscillation ceases so a 100K preset potentiometer (RV1) supplies this voltage, which comes from the 12v. 'R' line. A third voltage line is required for netting the transmitter. When tuning the transmitter to the frequency of a required station or vacant spot on the band, the VFO must be available during the receive state. The net switch allows the full 12v. 'R' supply to become available for this function. Each of the voltages is fed to the feedthrough on the VFO enclosure via a diode (D1, 2, 3). These diodes enable the voltages to pass to the VFO without interaction between the three lines.

Setting Up

Setting up this system is very simple. The changeover circuit board takes care of the sequencing by supplying the correct voltage (12v. 'T' or 12v. 'R') according to function. In the receive state, RV1 is used to reduce the voltage just below the point where oscillation ceases. The whole system is very simple to apply to the TX80 and less prone to troubles of setting up than the frequency offset method. When applied to the prototype TX80 it worked very well with the VFO coming up on frequency every time the transmitter was keyed into action. In theory it is a good idea when switching on the transmitter for the first time to leave it on in the netting position to allow the VFO to stabilise before operation. Having said this, in practice on my TX80 it appeared to make little difference to short term stability.

BOOKS REVIEW

WHILE some radio amateurs are solely interested in operating, having little interest in the technical aspects of the hobby, the majority retain and use the knowledge gained at school, college or R.A.E. class. Consequently there is always a demand for publications containing facts, formulae and general data, a typical example being *The Radio and Electronics Engineer's Pocket Book* by Keith Brindley. This is the sixteenth edition and it was first published in 1940.

The author's approach in choosing what to include and what to discard was, "What do I look up?" The result is a comprehensive book containing a great variety of useful information from resistor and capacitor colour codes to listings of British UHF TV transmitters, IC tables to U.K. amateur bands, component symbols to world time data, etc. Some of the symbols listed were rather unfamiliar; hands up those who have even heard of an apostilb, barn, erlang or mole, to pick out a few. In a brief review of this sort, one tends to look up information on familiar subjects to see if there are any errors. Only minor ones were discovered. In the Amateur Abbreviations for CW use, MO is defined as 'meter oscillator', TMN as 'tomorrow' and UR as 'you are', instead of 'master oscillator', 'TMW' and 'your', respectively.

As might be expected in this solid state age, there is extensive coverage of op-amps., transistors and ICs including fifteen pages of TTL and ten pages of CMOS pinouts. Unfortunately some of the pinout diagrams have not printed at all well rendering them useless. Apart from that, the printing is quite clear although some may need a magnifying glass to read the component symbols on pages 48-51. *The Radio and Electronics Engineer's Pocket Book* is published by *Newnes Technical Books* and is a 170 page, hardback size 196 x 93mm. and is available from *S.W.M.* Publications Dept. for £5.90 including postage and packing.

SERIOUS radio listeners and TV viewers will need no introduction to the *World Radio and TV Handbook*; 1986 is something of a milestone in its history in that it sees the 40th edition. To produce such an annual requires a tremendous

amount of work in getting so much information from countries all over the world.

The first section is a User's Guide in English, French, German and Spanish and includes contributions on the expected solar activity in 1986, appraisals of likely HF conditions and information on broadcasting organisations, time signal stations and DX clubs. The second, and largest, section is World Radio in which sound broadcasting stations are listed alphabetically for each continent. The information given is extensive and can be best illustrated by a typical example, such as the entry for Finland. This starts by giving the local time as +2 hours from GMT, programme languages as Finnish and Swedish and the electricity supply as 220/380v at 50 Hz. The particulars of the regulatory authority and public broadcasting service, including the name of the director general, follows. Next are listed the long and medium wave transmitters with their frequencies, powers, locations and programme service, then the FM transmitters. We find there are three services: group 'A' for serious music, education, current affairs, plays, etc.; group 'B' for light music, youth and talk programmes and group 'C' for Swedish listeners. Regional services are next listed followed by foreign service information which reveals thirteen shortwave frequencies. A complete column is devoted to schedules in English, German, Swedish and Finnish broadcasts showing frequencies, times and target areas. The entry is completed by announcement details and the signature tune and the information that there are 23 licences for private stations.

There are fourteen pages in this section devoted to broadcasts in English throughout the day, giving the countries and frequencies, and a couple of pages listing programmes for DX-ers and shortwave enthusiasts. For example, we find that the South African network broadcasts such programmes in English called "DX Corner" on Saturdays at 2100 and on Sundays at 0200, 0300, 0630, etc.

The third section is World Television which starts with tables showing all the main TV systems and channels. The listings follow the same continent/country format as for sound radio. The next

section lists the world's long and medium wave broadcasting stations grouped in Europe/Africa/Near and Middle East, East Asia/Pacific, N. America, Central America and South America, all in ascending frequency order with powers, callsigns and locations. Shortwave stations are listed in a similar manner so if you hear a station on, say 22,352.5 kHz, you will find Embratel, Brazil listed.

An important section of this handbook is devoted to receivers and in this edition there are reviews of the Danish ESKA RX99PL, the Heathkit/Zenith SW-7800, the Sony ICF-2001D or ICF-2010, the Yaesu FRG-7800, the Philips/Magnavox D2999, and from Taiwan the Sangean ATS-803, the ATS-801 and SG-789 plus the NRD-525 from JRC in Japan. The reviews are very positive with "no punches pulled". This section also includes a part entitled, "The best and worst equipment we have tested". The best includes the Drake R4245 and R-7A, the JRC NRD-515 and NRD-505, the Icom IC-R70, the Sony ICF-6800W/"White" and the Yaesu FRG-7700. The worst includes the Realistic DX-300 and DX-302 — "dreadful front-end performance" —

the *Drake SSR-1* "... and most other (e.g. *Century*) OEM guises . . .", the *National Panasonic DR-48/RF-4800* and "... any solid state receiver manufactured before the mid-1970s". Of current products the *Icom IC-R71*, *Sony IDF-6800W*/"Orange", *Yaesu FRG-8800* get reasonable recommendations, but the *Zenith SW-7800* gets slated. As for accessories, it is nice to read that they recommend, "Almost anything made by *Datong*: spit, polish and innovation", and well deserved, too. But of the *Grove ANT-9* antenna they report, "Wall-to-wall overloading".

The **World Radio and TV Handbook** is very well indexed and, once you learn how to use it, it has to be highly recommended for all serious radio and TV enthusiasts. It is published by Billboard Limited whose British office is in London and it is handled by Pitman Publishing Limited of London. It is available from us from stock at £19.15, inclusive of postage and packing. Orders for both books should be sent to the Publications Dept., *Short Wave Magazine*, 34 High Street, Welwyn, Herts. AL6 9EQ.

N.A.S.F.

"Beyond the Call"

G4XEK

OR perhaps it should be a question of take your pick from G5CIQ, W5MJQ, VE7ACN, K2GMO, F0BLB or DL4OZ, all of which have been issued at some time to Bob Ainge, the subject of this month's feature, and from which it is obvious that he has done a fair amount of travelling in his time.

His early interest in amateur radio started soon after the war and he joined the British Shortwave League in November 1945 with the membership number 2120. He was also an early member

of the International Shortwave League and holds membership certificate G219.

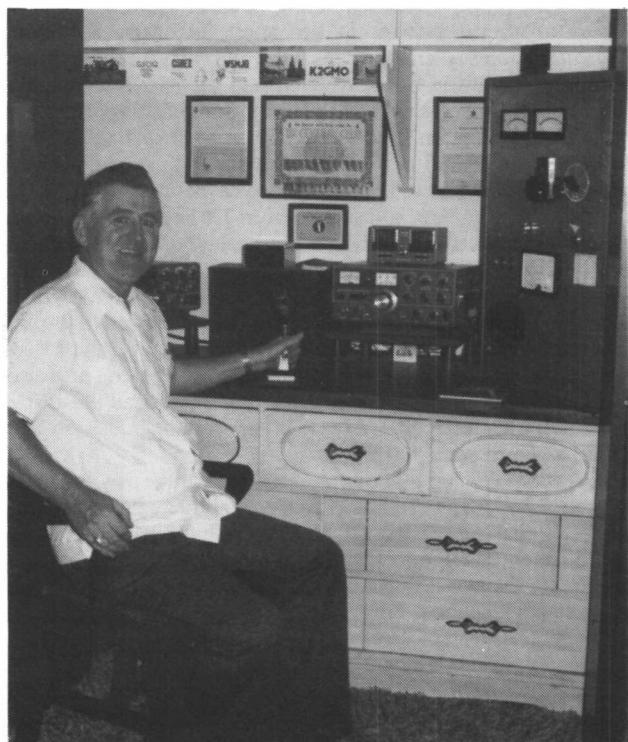
At about this time he became great friends with G2YV and the late G3ABG and spent many hours operating from their stations in the early 1950s when such operation was perfectly legal. It was also the peak of the sunspot cycle and Bob remembers the many American servicemen who were still inhabiting practically every small island in the Pacific and still having use of high power BC-610 transmitters plus the companion BC-342 or AR88 receivers. These provided a very potent combination and some very strong signals and his interest in the DX bands was such that after going to Canada he got his ticket as VE7ACN in 1950. Soon after this he started a period of travelling in which he operated from all the 48 (now 50) states of the U.S.A.

Bob later settled in The States and subsequent activity was under the callsign K2GMO for several years, with a spell in Germany as DL4OZ during 1954-55. He then moved to Texas and became W5MJQ in 1962 and still holds that callsign.

He worked at the world-renowned Bell Telephone Labs in New Jersey for many years and during this period he was engaged on work for the Telstar satellite, which many of you will remember waiting for to see the first relayed transatlantic TV pictures. Bob says that it was a real thrill to hear the first voice cross from this side of the Atlantic and to recognise it as Charles Hill (who amongst his other and heavier responsibilities did a well-known series of broadcasts as the 'Radio Doctor' on popular medical matters).

Bob married his Mexican wife Moria and for twenty years they ran a radio and TV repair company on the Mexican border. His interest in amateur radio continued and during this time he was heavily involved in DX chasing. This was done to good effect and he is now the proud holder of the ARRL DXCC certificate with 325 countries confirmed.

In 1983 he came to Great Britain and after holding the callsign G5CIQ he was issued with the present call G4XEK during the big shuffle. His main interests now are on the VHF bands and in particular CW and SSB operation on two metres from his present QTH at Cheadle.



• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

WE have an interesting question to start off this time; *E. Sweeney (Chingford, E.4)* is a pensioner who took up the SWL hobby a couple of years ago and now, at over 70, the DX listening bug has got him. The question he poses is this: his NRD-515 is now about three years old, and he wonders whether it should be given a service and tweak-up for the very best results. Frankly we would think not, but a pretty good test — always assuming there is nothing obvious such as a crackling pot or a 'dicky' switch — is to put the receiver on to a dummy load and see if, with all the gains open, one can 'peak' the noise from the speaker by rotating the preselector knob. The test should be repeated on each band, and of course one would also expect that the preselector knob peaks roughly where the markings suggest it should. This is quite a severe test of any receiver in terms of sheer sensitivity, and involves no more than getting a small 51-ohm resistor from somewhere, and connecting it between aerial and earth terminals, or across the coaxial input socket (after of course disconnecting the aerial!).

It is true to say that the reliability of any bit of equipment — whether cars, human bodies or electronic gear — follows, graphically, a curve which markedly follows the shape of a section through a domestic bath; hence the name 'bath-tub curve'. What this curve means, in simple terms, is that one is likely to have failures in the first few hours of working (the "infant mortality" period) after which things settle down for a long period of reliable service. However, after this one again begins to see a rise in the number of faults as the old age or wear-out period begins — but even then the rate of failure in old age is not so steep as in the infant mortality phase. Thus it is that the makers of high-technology electronics not only try to buy components that are 'burnt-in' but also give the completed equipment a couple of days, or even a week, in an oven which cycles the equipment through its full temperature range; and often there is a failure of a component during the burn-in phase — which is then replaced — despite the high-quality components used.

So — to sum up, apply the simple test mentioned and if it passes, press on regardless!

However, what if it fails? All we can say is that there is a lot of difference between a modern amateur receiver and, say, a TV set; so to prove that the rig is spot on requires good technical knowledge, and good test gear. And that, unfortunately, adds up to expense!

The Mail

There seems to be some pretty wide-spread misconceptions about aerials in terms of SWL. Generally, it would seem that the SWL hops around the bands far more than the licensed type. Normally a licensed amateur has one or two 'pet' bands which he favours, plus maybe a VHF allocation for the local natter, but the SWL often wants to look at all the amateur bands and maybe even do some BC listening as well . . . and all on one aerial! Perhaps the best answer to this requirement is the end-fed arrangement, using an aerial tuning unit and a *good* earth. However it must be realised that if one is using, say, the popular 132 feet to cover all bands from 1.8 to 30 MHz, then the favoured direction will vary from one band to another. On Top Band an aerial running N-S will favour the E-W directions, but by the time we get to 28 MHz, it will noticeably be firing along the line of the wire or N-S; and it may even be noted that there is a bias in favour of North or South depending on which end of the wire goes to the ATU. But, versatile as such an aerial is — giving coverage of all the major

land masses on one band or another — it has compensating disadvantages. Firstly it is very dependent on the earth connection and its quality, and it is most important that this fact be kept in mind. Secondly it is markedly inclined to suffer from unwanted noises from TV sets and other man-made QRM generators; and thirdly, if it is used without an ATU it is quite likely that the end-fed aerial will present the receiver with all sorts of unwanted signals to greater or less degree, and these may well lead to receiver over-loading and the consequent need for the use of RF attenuation or RF gain control in order to drop the noise level.

The other big snag is more mundane — the house, and hence the shack, is usually sited near the centre of the plot! Thus, if one tries to use the whole length of the plot, the 'shack end' is going to double back on itself and so cause some degree of cancellation; and by the same token, deviation from the straight will tend to make the behaviour less predictable, directionally. But it's all good fun and better than mowing the grass!

R. G. Williams (Borehamwood) has an FRG-7 plus a Joystick and its Joymatch ATU. His first two lists come to a total of 414, and it is noticeable that the first one was a print-out and the second one a hand-listing . . . a computer crash, maybe? An interesting one was GW0AVD on Holy Island working a string of Gs; this sent your J. C. to the map, as he had forgotten that Holyhead sits on Holy Island, in GW, while the one we usually think of as Holy Island is the place on the north-east coast, not far from the Scottish border.

That question of the IK prefix raised by Maurice Graham last time is answered for us by *Dino Bragoli (London N20)* who is also G0ANC. Dino says that the 'I' series ran out and the next lot of calls are the IK series. So, all you can say about an IK call is that it is a fairly new one. Dino also points out that the *numeral* in an Italian call defines the Province, rather as the American system did until the recent 'irrationalisation' of their arrangements.

In a query on suffixes in her latest list, *Mrs. R. Smith (Nuneaton)* notes several puzzling ones; and we suspect they are in fact the prime letters of the Maidenhead squares; but we can't confirm, since we crashed our squares program listing. Ruth has an EA5 suffix YY, an LA8 suffix FT, an SM0 suffix JT, GM6 suffix ZU, and UA6 suffix TH. Anyone with a Maidenhead squares program care to confirm this, please?

R. Wooden (Staines) still suffers from TV line timebase noise, which has knocked his activity right back, but as the summer comes on and Twenty is more often open things will be a little easier, that being the best band in terms of TV noise. We would have thought that there was justification for inserting a high-pass filter and a braid-breaker into the TV set feeder right at the TV set — the argument being that what stops the stuff getting in is also equally effective in stopping it getting *out!* To re-read the article by Ron Barker in *S.W.M.* back in the mid-seventies on this subject is worth while.

M. Ribton (Gillingham) was pleased to find three new countries by way of 5V7AS, TJ1AF and D68WS; and equally so to hear GW0EGF making his first HF contact, with OZ9LV.

A different slant on operating is suggested by *B. Patchett (Sheffield)*; the idea is to get on and make a complete QSO in the other chap's language. This of course is a summer-time exercise for ten metres, using QRP to a CB-set conversion, as the VHF-mode openings on that band give propagation to the Continent. One could wish for such where old J. C. lives — but one could only do this from a P location as the J. C. valley is surrounded by young mountains in all directions. On a different tack, having

This is the NRD-525 general coverage double-superheterodyne receiver, one of the latest products of Japan Radio Company. Standard coverage is 34 to 90 MHz, with optional internal converter adding 34 to 60, 114 to 174, and 423 to 456 MHz; modes are USB/LSB/CW/AM/FM/RTTY. Features include all-mode squelch, notch filter, passband tuning, keyboard frequency entry, 200 memory channels, memory scan and frequency sweep, dual time clocks, tunable BFO, adjustable level noise blanker, and more. The NRD-525 is available from Lowe Electronics Ltd., Chesterfield Road, Matlock, Derbyshire DE4 5LE. (Tel: 0629-2817/2430/4057/4995).



been stuck for new prefixes for some time, Brian found four in a few minutes on March 15, including 9V1.

Back to M. Ribton and his second letter. Apart from mentioning the wonderful aerial-farming possibilities raised by the discovery that his loft-space includes the area over the next-door house which lacks a trap, we were a bit amused by the statement "It's 12.30 now and I want an early night!"

J. Routledge (Hartlepool) says he still hasn't reached the 1000 mark, simply because he has been frozen out of the shack. We know the feeling!

N. Fox (Wakefield) is only partly operational since he has just moved; but nonetheless the new place seems to be better from the radio point of view; and the sight of open fields and the Pennines in the distance is not to be complained of, either!

N. Henbrey (Northiam) will be no doubt preparing for the cricket season, but he still has his receivers: FRG-7700, and FR-DX400, plus a TA31 trap dipole, a 132-ft. end-fed wire with its ATU, 8-by-8 slot-fed Yagi on 144 MHz, and 48-element multi-beam on 432 MHz. That is some aerial set-up, as befits a leading SWL — Norman has been at it for over twenty years to the writer's own knowledge.

Now to another OT, in E. W. Robinson (Felixstowe); it is very noticeable that these OTs have very rigorous definitions of a 'hearing' before they make a claim, and we believe that this gives them more fun than so many of those who will claim a station as heard when they have just caught the callsign. Your old J. C. doesn't reckon to add one to the score until he has got the call, the

name, the QTH, and several reports to other stations — and while it slows down the scoring it makes the listening more interesting.

Next we come to W. J. Prior (Lochcarron) up there in Ross & Cromarty. Bill is an RTTY addict, and his entry is in this mode; a couple of queries included KD8IUU and 457AVR. The first one is almost certainly a run-of-the-mill States-side W8, but the other one is a bit more of a conundrum; we incline to think it was not '457AVR' as the machine copied it, but more likely a 4S7AVR — but how that could occur in Murray code is not so easy to see! More likely RT7 with a missed shift symbol, or perhaps even just what the machine decoded — but in the absence of firmer evidence, we must disallow it and assume it to have been either a pirate or an intruder. Hard luck!

The letter from H. M. Graham (Chesham) is always of interest; Maurice found something on all bands save Eighty; Ten gave with the opening on March 6 to North and South America plus Africa, and 21/14 MHz were the mainstays — all Continents on Fifteen and most on Twenty — but clearly Maurice prefers his 21 MHz activity and only goes on Twenty for comparative purposes.

E. M. Gauci (Siema, Malta) goes on his way — he must spend lots of time at the receiver, which by the way is an FRG-7000. However, Eddie's main point is that we should seriously consider whether to run the Annual Table right through the year, rather than transferring an entrant to the All-Time at 500. The original table made no distinctions, back in the early sixties, but the idea of an Annual Ladder was to give the newcomers something to compete in while they built up their skills to the point where they could reasonably go into the All-Time listings. Eddie's idea is that the objective should be competition to see who can hear the most prefixes in a single year, which is back to competition for the dab-hands. Most of these will have heard lots of prefixes since January 1 but not recorded them, we would think. However, we will run a full-year annual table for the experts as a third section, if enough entries come in next time. However, we must insist on a separate list for each section entered — coloured underlinings and so on are just too darned confusing to J. C.'s admittedly woolly brainbox!

F. Dunn (Chester) found band conditions pretty punk and so reduced his scoring rate; but he is burning an adequacy of best-quality joss-sticks for an upturn in this area — we would have thought the big lift around February and March was good enough for anyone at the bottom of the sunspot cycle. However, without calling for a list with dates on, we can hardly know — Frank may have not looked in the shack at all during the relevant times.

A. Vest (Durham) now signs G0EBV and we congratulate him

ANNUAL HPX LADDER

Starting date, January 1, 1986

SWL	PREFICES
R. G. Williams (Borehamwood)	414
L. Marquardt (Hereford)	370
S. Field (Barningham, Suffolk)	319

This is the first appearance of the 1986 Table. For an entry to be made a minimum of 200 Prefixes are to have been heard, in accordance with HPX Rules — see p. 29, March issue. At score 500, automatic transfer will be made to the All-Time ladder, but for this year those who so wish may continue in the Annual Table, provided a separate listing is sent in (where applicable) from the All-Time list. Thus the 1986 final listing, to appear in the March 1987 issue will show who has heard the most Prefixes in year 1986.

HPX LADDER (All Time Post War)

SWL PREFIXES

PHONE ONLY

B. Hughes (Harvington)	3126	G. Caselton (Orpington)	730
E. M. Gauci (Sliema, Malta)	2809	J. J. Sales (Lancaster)	697
Mrs. R. Smith (Nuneaton)	2559	A. Vest (Durham)	605
E. W. Robinson (Felixstowe)	2455	N. Fox (Wakefield)	570
H. M. Graham (Chesham)	1854	I. Thomson (Rye)	564
M. Rodgers (Harwood)	1622	S. Wilson (St. Andrews)	538
P. Oliver (Paisley)	1578	C. Burrells (Stevenage)	506
S. Baker (Cwmbran)	1527	J. Singleton (Withernsea)	506
N. Henbrey (Northiam)	1430	Mrs. T. Carmichael (Lincoln)	502
N. E. Jennings (Rye)	1411		
F. Dunn (Chester)	1390		
N. Askew (Coventry)	1367		
R. Fox (Northampton)	1305		
P. Davies (Market Drayton)	1175		
M. Ribton (Gillingham)	1111		
G. Shipton (Rye)	1091		
G. A. Carmichael (Lincoln)	1077		
J. Routledge (Hartlepool)	991	N. E. Jennings (Rye)	674
M. Hudson (Folkestone)	987	P. Lincoln (Aldershot)	530
P. Lincoln (Aldershot)	888	J. Routledge (Hartlepool)	347
B. Patchett (Sheffield)	858	W. J. Prior (Lochcarron)	348
R. Wooden (Staines)	794	N. Henbrey (Northiam)	306
J. Heath (St. Ives)	788	R. Fox (Northampton)	233

CW ONLY

F. Dunn (Chester)	1811
J. Goodrick (I.O.W.)	1763
A. Vest (Durham)	858

RTTY ONLY

N. E. Jennings (Rye)	674
P. Lincoln (Aldershot)	530
J. Routledge (Hartlepool)	347
W. J. Prior (Lochcarron)	348
N. Henbrey (Northiam)	306
R. Fox (Northampton)	233

Minimum score for an entry is 500 for Phone, 200 for CW or RTTY. Listings to be in accordance with HPX Rules.

and others who now sport callsigns. He seems to have celebrated with quite a large score increase — perhaps he has been listening just that bit harder for the DX!

A short list from N. Jennings (Rye) who says he has got himself and his computer involved in his son's business, with analysis and costings, which has been absorbing his time and interest — and adds that he is on the phone at any time of day *except* afternoon nap times. That seems fair enough, at 77!

L. Marquardt (Hereford) has just ten more to add to his total, but in addition he has received a goodly batch of QSL cards, which is doubtless the beginning of some wall decoration!

S. Field (Barningham, Suffolk) has been interested for four years and active for the past two. Initially it was in Holland where PA3AHV and PA3ACQ involved him in J-O-T-A activity and he joined VERON. Then came a move to London and consequent joining of RSGB. The receiver then was a Panasonic DR26, but it is now the back-up to the FRG-7700 which is nowadays the favourite. Since the move to Suffolk, the aerial farm has grown and now there is a multi-band dipole (7, 14, 21, 28 MHz) plus a 22-metre wire for the DR26. All this by courtesy of one home-brew mast, one house chimney and an opportune tree thanks to friendly neighbours! Under the window there is a 'young copper mine' and we don't doubt that is the most important bit. Stuart used to be a member of the Edgware club when he was in London and they have set him full steam ahead for the RAE. So — we must await news of another pass!

B. F. Hughes (Harvington) has been retired on medical grounds after some 23-plus years in the Ambulance Service; so now it is possible to put in a bit more time at the DX-chasing. On a different tack, Bernard mentions that he sent a batch of cards off in November 1982, and that the latest return envelope contains the returns from half of that batch! Not surprising really as, no matter how quick the Bureau system itself is, if the guy at the far end is tardy with his cards then there is a delay. Since writing out cards is a chore, that is where the delay usually occurs!

P. Oliver (Paisley) sends a short note this time so as to catch the deadline; Pete says it was a lean period for prefixes but the ARRL Phone contest yielded him some new Stateside ones. In addition,

a certificate for his participation in J-O-T-A and an award now adorn the shack.

M. Rodgers (Harwood) was never one to waste words — we can't recall how long it is since he sent in much more than a Table update — but Mike makes up for it by his regular listings and we suspect he is another of those who sets his own rules for a 'hearing' which are harder than the minimum.

From Shrewsbury comes a letter from P. A. H. Evans, who notes that he was BRS 27686 and ISWL G6553, but let it drop after he moved from his country QTH at Hanwood. However, Part 1 of the RAE has been passed and it is intended that Part 2 will be passed in May, so the hunt is now on for a second-hand two-metre rig. If anyone has a suitable device to dispose of, perhaps they would get in touch with Philip, on Shrewsbury 92425.

Finally, a great thick wad of paper from P. Davies (Market Drayton) which is in fact a claim for 1175 prefixes on Phone, all heard on an Eddystone 840A bought new in 1959 and still going strong, with a folded dipole for 21 MHz in the loft providing the all-band aerial. Philip seems to have been quite active in the 1959 — 1964 period, and then to have been QRT until 1985 when serious listening was started again and the majority of the prefixes claimed. However the 1959 — 1964 ones were listed separately and provided your old scribe with a lot of reminders of old times. GI6TK, the late Frank Robb, on Top Band and those calls suffixed AMS belonging to Angus Murray-Stone; not to mention the reminder that around 1960 the KA prefix covered U.S. forces in Japan, KG1 were U.S. forces in Greenland, KG4 Guantanamo in Cuba, and so on. Of course, these prefixes can't be counted twice — the fact that you can hear a KA2 today but he's only a common-or-garden W is just part of 'the way the cookie crumbles' in HPX terms, as the rules make quite clear. But what memories it brought back!

Finale

Not much room left if we are to include the HPX listings and the Directory, so it just remains to tell you the deadline for your letters for the next column is May 22, and of course addressed to "SWL" Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ. 'Bye now!

Directory of SWL Names & Addresses

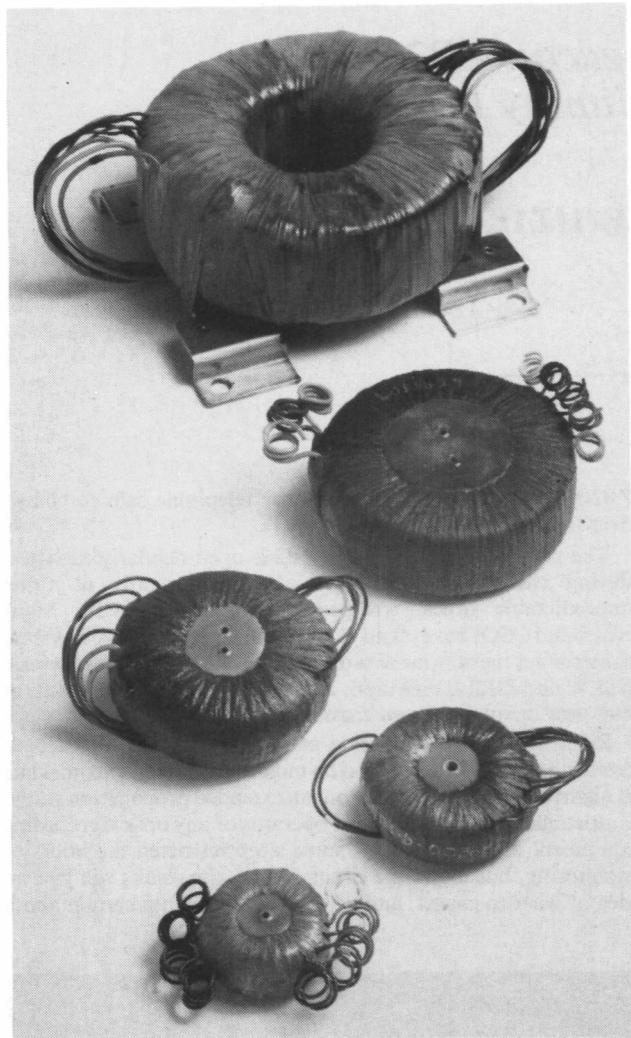
H. M. Graham, 20 Little Spring, Chesham, Bucks. HP5 2BZ.
N. Henbrey, 1 Perryman's Cottages, Northiam, Rye, E. Sussex TN31 6HX. (07974 — 2437).
N. E. Jennings, 64 Udimore Road, Rye, E. Sussex TN31 7DS. (0797 — 222530).

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CONTEMPORARY BRIEFS...

AVEL-LINDBERG LIMITED offers a standard range of toroidal transformers as has been reviewed in previous issues. This has been so successful that a "Small Quantities and Prototype Department" has been established on a one to twenty batch limit. This facility "... can tackle anything within the limits imposed by winding machine and wire technology". Wire



gauges from 0.04 to 2.00mm. can be wound. In addition to dry finish Melinex tape components, full impregnation and resin filling can be undertaken for transformers destined for hazardous environments. For further information contact Mr. R. S. Mattin (Managing Director), Avel-Lindberg Ltd., South Ockendon, Essex RM15 5TD. (Tel. no. 0708 853444 and Telex no. 897106.)

CIRKIT DISTRIBUTION has added to its extensive component range the Bulgin "Polysnap" range of snap-in bezels. These enable up to four components to be fitted into one panel cut-out, thus simplifying assembly procedures. At present, they offer twenty-four component permutations from single and double-pole switches, neon switches, fuse-holders, filtered and unfiltered inlets. For further information and a copy of the

product leaflet contact:— **Cirkit Distribution**, Park Lane, Broxbourne, Herts. EN10 7NQ. (Tel. no. 0992 444111 and Telex no. 22478.)

Cirkit Distribution is exhibiting at 'British Electronics Week' at Olympia 2 from April 29 to May 1 at which they will be concluding an agreement with *Belling and Lee Intec* for the U.K. distribution of its range of fibre optic components. These products will be on stand no. 326. At the show they will also be featuring electro-mechanical and electronics counters from *IVO Industries*, a new generation of thumb-wheel switches from *Crameda*, *Alps* chip capacitors, resistors and resistor networks, *Weller* soldering stations with new PSUs, *PCI* dot matrix modules and *Toko* chip inductors.

DANESBURY INSTRUMENTS are distributors of quality electronic instruments and accessories and have just sent in their 5th edition Catalogue listing a wide range of test equipment of all kinds from some of the world's leading manufacturers. These include *Awilco* (Danish) who make rechargeable batteries; *AOIP* (French) precision measuring equipment; *Black Star* (U.K.) counters and function generators; *Coline Ltd.* (U.K.) test leads and probes; *Gulton* (U.S.A./U.K.) temperature control systems; *Hitachi* (Japan) oscilloscopes; *Keighley* (U.S.A.) digital test and measuring gear; *Merlin Gerin Ltd.* (U.K.) actually a French company specialising in mains conditioning equipment; *Northern Design* (U.K.) power measuring gear; *Rikadenki* (Japan) X-Y plotters and recorders; *Superior Electric* (U.S.A.) *Stabline* mains analysis/monitoring and conditioning equipment; *Thandar* (U.K.) test gear; *Thurlby* (U.K.) medium priced test gear and add-ons and *Unaohm* (Italian) signal sources, function generators, counters, PSUs, etc.

A few products can be hired on short term rental at so-much per week. For example, if you do not want to buy the ND-306 Power System Recorder from *Northern Design* for £2,490, you can hire it for £70 per week plus insurance, etc. This catalogue is a 24-page A4 one and can be obtained from **Danesbury Instruments**, 22 Parkway, Welwyn Garden City, Herts. AL6 8HG. (Tel. no. 0707 338623.)

N.A.S.F.

Amateur Electronics/Holdings

A 160-metre kit, priced at £6.75 including post/packing, to fit the KW E-Zee Match and other 'Z' matches is now being marketed by **Amateur Electronics/Holdings** of 45 Johnston Street, Blackburn BB2 1EF (0254-59595). The kit includes switch, coil and full instructions, with simple installation, and is claimed to match with good efficiency impedances from 10-200 ohms and so should resonate 160m. dipoles or wires 50 to 200 feet long.

I.C.S. Electronics

Following the introduction of the Alinco ALM-203E 2m. handheld transceiver at the end of last year, **I.C.S. Electronics Ltd.**, now announce the availability of the new ALR-206E 25/5 watt mobile transceiver. This compact unit has back-lit LCD frequency and S-meter readout and programmable features including band scan, 10 memory channels, memory scan and frequency selection, and all these features can be accessed from a keypad on the rear of the microphone; a mobile mount is included as standard. The price of the ALR-206E is £295.00 inc. VAT, and it is available from I.C.S. Electronics Ltd., P.O. Box 2, Arundel, West Sussex BN18 0NX (024365-590).

Propagation Study on 50 MHz during Sunspot Maximum, Cycle 21

Part 1

reception of Gibraltar beacon ZB2VHF on 50.035 MHz, operated by Jimmy Bruzon ZB2BL

KEN ELLIS, G5KW (ex-SU1KE/HZ1KE/MD5KW, etc.)

FROM conversations monitored on six metres since the band was generally released on February 1st this year, and despite the publicity given in "VHF Bands" and other sources many of the newcomers to the six-metre band seem unaware of past results and possibilities for the future. It is intended therefore to repeat some of the more important events and deal with future possibilities.

I was fortunate enough to be given permission to operate at the Garrison Fort, St. Mary's, Isles of Scilly, by kind permission of Colonel Robertson, the I.o.S. Land Steward of the Duchy of Cornwall, during the sunspot cycle peak period 1980-1982.

The Gibraltar Beacon

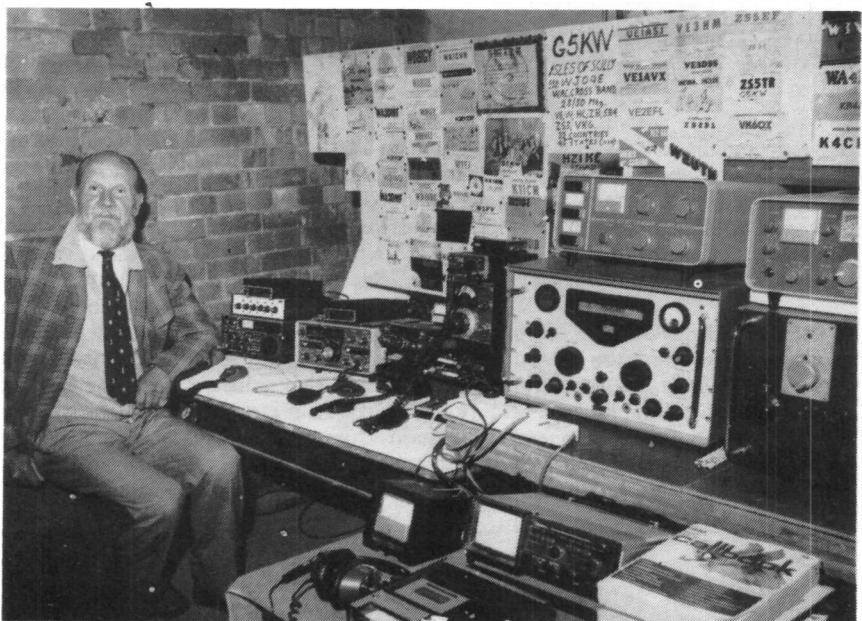
See Fig. 1. This beacon has been operating successfully for a number of years, and has been a valuable guide to propagation by different modes with world wide reports of reception and Jimmy,

ZB2BL, has had many long distance telephone calls to change over for direct QSOs.

The path between G/EI and ZB2 is open regularly each year during the summer months and occasionally at other unpredictable times, irrespective of solar activity. Many crossband QSOs have taken place over the years, 2/4/10 metres to 6 metres but the all-time first direct 6/6 QSO G/ZB2 was between G5KW and ZB2BL on May 6, 1983 at 0645z. During June-July of that year many direct and crossband QSOs took place.

Referring to Fig. 1, during early May of 1981 I had been receiving the ZB2VHF beacon on most days and several times late at night; so I decided to carry out an extended propagation study. Unfortunately I had no second operator or any optical recording equipment and the need for some sleep restricted the hours of monitoring, but under the circumstances the results will give an idea of what to expect, and when. We are still not certain about

The author in his shack at Garrison Fort, St. Mary's on the Isles of Scilly (WJ09e). On the far left is the Icom IC-551 6m. transceiver with the memory keyer and Microwave Modules 100-watt amplifier on top; to their right is the stand-by Yaesu FT-620B 6m. transceiver. The QSLs are for crossband 6m. to 10m. QSOs.



CYCLE 21

RECEPTION OF GIBRALTAR BEACON 50.035MHz AT ISLES OF SCILLY

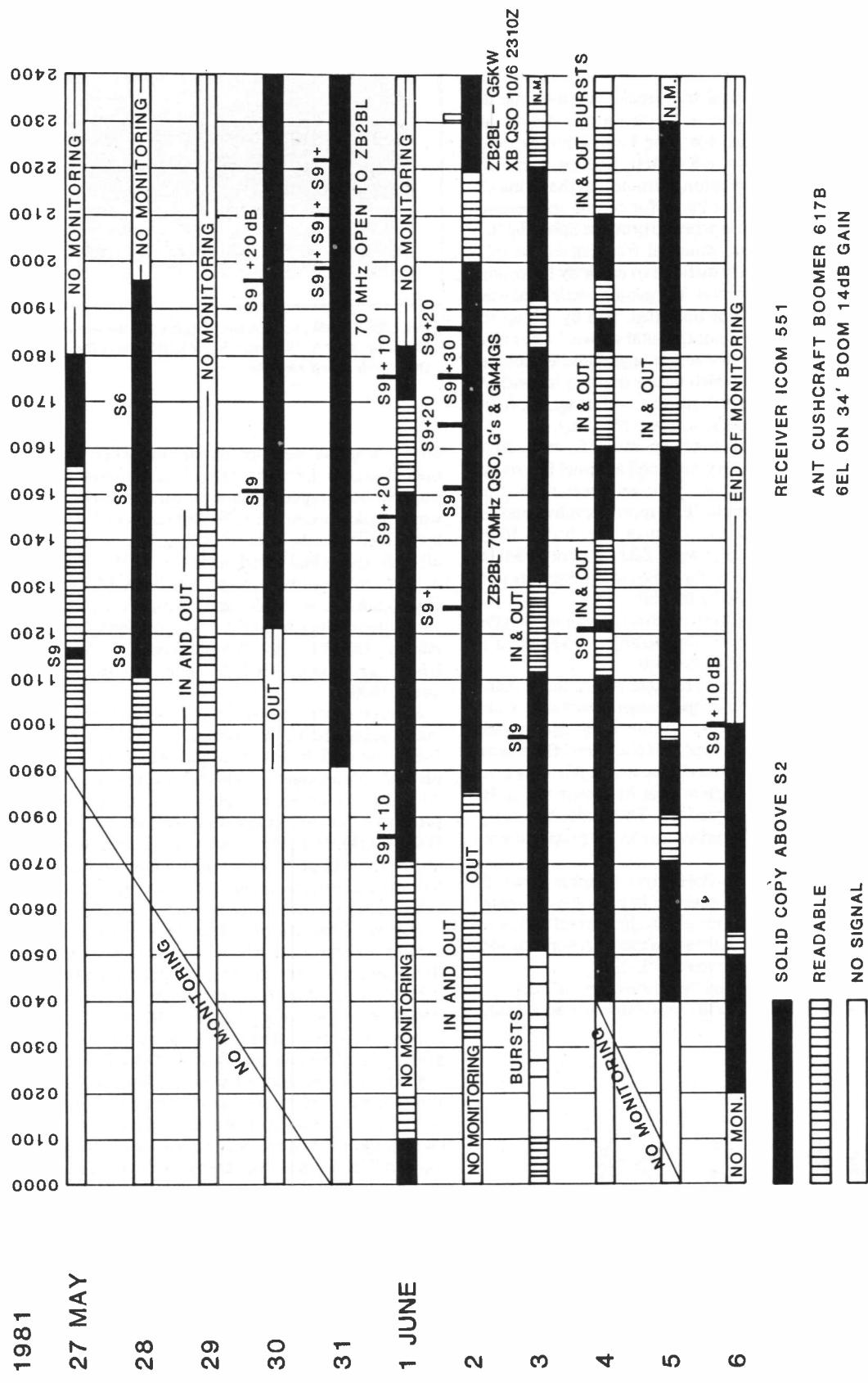


Fig. 1

(BY KIND PERMISSION COL.ROBERTSON
DUCHY OF CORNWALL OFFICE T.O.S.)

the combination of modes responsible for the consistency of this North/South path for 2/4/10 to 6 metres, but now that CT1WW is operational, with others soon to join us in exploiting the six-metre band, hopefully some answers will be found before long; in the meantime I am grateful for the following comments on Fig. 1 by Charlie Newton, G2FKZ, of the R.S.G.B. Propagation Studies Committee:—

"If we look at the F2 critical frequencies for the time in question, May 27th to 31st, then at Appleton they did not at any time exceed 9.8 MHz; and for June 1st to 6th they were dropping from 9.9 MHz down to 8.6 MHz. So how does a 50 MHz and 70 MHz signal traverse long distances at these times? The honest answer is we do not know for certain the precise mechanism; but summer time is prone to produce Sporadic 'E' and both 50 and 70 MHz are practical frequencies for this mode, also Sporadic 'E' is very difficult to catch by Ionosonde Stations so most of it is unrecorded. The geomagnetic field was quiet up to the 5th then became unsettled, and by 7th up to storm level. However all this is not the total answer! The daily time pattern must relate to solar zenith angles and of course ZB2 is due south from Scilly, which means that any ionisation would align itself along the earth's north/south magnetic field lines; this would enhance any signal going that way."

The big question is — what causes Sporadic 'E' in the first place? Well at present your theory is as good as mine! But some answers are beyond doubt: as you get nearer to the mediterranean area then Sporadic 'E' is more prevalent and as you transverse north/south the chances are better than east/west, so it's not surprising to work ZB2 on 50 or 70 MHz — or for that matter GM4IGS as the reflection point does not need to be very far north of Scilly for this.

We have not considered 'tilting electron gradients' which can increase the MUF very considerably; whether it's minimum or maximum is little to do with it."

By the time the original forty permits were issued three years ago there had been a considerable drop in sunspot activity, solar flux and DX possibilities, and due to the long drawn out negotiations (which have been fully reported elsewhere) the recent general release of the band, welcome as it is, came at the trough of the present cycle when F2 propagation is at its lowest and only probable on a few unpredictable occasions. There will, however, be international DX openings by other modes of propagation; these will be referred to briefly:

'E' layer — single and multi hop: The E-layer, which is about 70 miles above the ground, can give on single hop an approximate range of 1250 miles but if two clouds are in the correct position relative to each other much greater distances can be covered as for instance between the east and west coast of U.S.A.

E-layer results can also be extended by various types of ducting. During my operations at Isles of Scilly, and later at Lands End,



"It's useful for finding dropped grub screws . . ."

CALL	DATE	TIME	MHZ	RST	2-WAY	QSL	PSE	TNX
G5KW	6 MAY 83	0245	50	339	CW			

Ken Ellis, G5KW, was the first English station to work Gibraltar on 50 MHz, on May 6, 1983 on CW. ZB2BL was using an Icom IC-551D and a 5-ele. Yagi antenna.

during suitable weather conditions when marine ducts were operating over the North Atlantic unique conditions prevailed not possible from higher ground or further inland. Nov. 13th, 1981, was a typical example: G3WBQ remarks "it was fascinating to hear G5KW on the Isles of Scilly giving S9 reports an hour or so after all signals had faded out at my QTH". During the afternoon of that day I had had crossband 10/6 QSOs with the usual East Coast stations. As it got dark a temperature inversion took place with intense ducting and I had crossband QSOs with K0GUV, N6AJ, K6MYC, K9JWV, WA6PEV, VE3LNX, W9JMS, KB2YJ and finally K0GUV again. The six-metre signals fading out at 1800z.

Several other similar cases have occurred since the most outstanding one (fully reported in "VHF Bands" in the August 1984 issue of *S.W.M.*, page 262) when GJ3YHU, between 2230 on June 30 through to 0100 the next morning, worked 47 North American stations in eight U.S. states and one Canadian province. The only other station on this side hearing any of the DX was G3PBV in Devon who heard some of the stations weakly at Newton Abbot. Many of the stations were only using ten watts to a dipole antenna so our low power restriction does *not* mean DX is impossible if conditions are favourable.

Auroral Propagation: Much has been written about Auroral Scatter Propagation which occurs at any time after unusual disturbances on the sun but generally during spring and autumn. A major proton flare eruption on Feb. 6th this year came at a most opportune time, giving one of the longest periods of aurora scatter propagation for some years, lasting for about five hours on afternoon of 7th Feb. and from 1300 8th Feb. through until 0200 9th Feb. An interesting point to note is that whereas on two metres the Doppler is so pronounced that SSB signals are sufficiently distorted as to be difficult to read, in most cases during this aurora most of the six-metre signals were readable and most of the QSOs were on SSB. Future cases are awaited with interest. We have a lot to learn about this interesting mode of propagation! I have already heard by 'A' a VE3 but due to the heavy Doppler effect positive identification of the remainder of the call was not made.

Transequatorial Scatter (TEP): This form of propagation over the north/south path centred by the magnetic equator gives reliable results even when solar activity is low. In U.K. we are well outside the primary and secondary areas but some interesting results have been observed particularly to South Africa. In addition to forward scatter by TEP some back scatter effects were observed between G5KW and ZD8TC, with the characteristic high rate of evening flutter.

F2 Propagation: This will be dealt with in Part 2 when world wide DX is detailed.

to be continued

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

ONCE again, as far as the writer is concerned, not much actual time has been spent on the bands. However, I have now got a dipole for 14 MHz up in the roof-space (and been rather more than surprised at how well it performs) and a Best Bent Wire round the backyard — mostly at five feet but rising at one point to the dizzy height of fifteen feet, which has been persuaded to load on 1.8 and 3.5 MHz. Doubtless, I will be able to provoke it into 'perking' on 7 MHz in due course and then we will see what we will see. One thing about it, the present set-up should serve to fill in the more local areas — but it will be instructive to see just what can be worked with this aerial farm!

The Bands

Pretty average for the time of the sunspot cycle; and that in its turn sums up as 'pretty bloody'! However, one of the pleasures of this amateur radio game is the way that even bad conditions have a habit of turning something up to entertain one. Even the types with a beam have not found any Pacific stations, for example, over the long path, although the odd VK and ZL appears in the reports and your scribe was surprised, just as he was reaching for the Big Switch one day, to hear a weak JA on the loft aerial — weak but workable.

It is interesting too to notice how, with the present tiny sunspot count, slight changes of conditions can turn things round on Twenty and Forty, while the other bands remain unaffected.

Ten Metres

It is of great interest, with the increased non-DX activity on the band and the wider spread of the beacons, how even at the present one hears of the odd report from a long way away. (Provides entertainment too, as when I heard someone frantically calling a beacon.) Hence, the White Rose Club Ten-metre Activity Days, on May 25, June 29, July 27 and August 31. All modes, from 0900 for eight hours, amateurs and SWLs. The suggested segments are: CW on 28-28.1, SSB 28.5-28.6, and FM at 29 MHz. No satellite reports are wanted. White Rose Club, to encourage activity, is giving away prizes, one for the report with the most useful information in the study of propagation, another for the station — more than 50 km. from Leeds — who can work the most White Rose Club members; and the third for the SWL presenting the log which shows the most different stations/countries heard, with the proviso that both

sides of the QSO are to appear in the log. All entries to the White Rose Radio Society, Box 73, Leeds L51 5AR, to arrive not more than a week after each Activity Day. The evaluation of the results will be done by RSGB's HF and Propagation Studies Committee members. Your scribe commends the exercise to you all as worthy of support; I wish, though, that satellite reports had been called for too, as I have for long suspected that hidden among all the straight-up-and-down QSOs and reports there is, lurking in people's logs, much useful knowledge of ten-metre propagation. For example the hearing of a satellite before AOS or after LOS times, when the bird is well below the horizon but the angles at which the signals brush the ionosphere are very shallow, could maybe increase our knowledge of what goes on up there.

G4ZZG (Warrington) says he tried a CQ call at around noon, first on SSB and then CW; the CW netted a contact with G6LC on March 12, and on 17th there was an SSB contact with EA4DQD who had QRP to a ground-plane aerial. Other EAs were also audible at that time but all from the Madrid area. Otherwise, nothing — not even a beacon.

The two-ele. Quad and TS-820 continue in use at G4HZW (Knutsford); but it still produced "a flat month". The ZS6PW and Z21ANB beacons were noted on March 11, 12, 13; and the CQ WW contest yielded weak PY signals on March 29, and an opening to YU on 30th. Otherwise, there were QSOs with D68WS on March 12, ZS3UE on the same day, plus YU3FW, 4N2E, YT3T, YU2AKL all on 30th. On a different line, G4HZW has a converted CB rig on Ten now and is enjoying the nattering. The other hobby Tony has is bird-watching, and before this reaches print, he expects to spend a week looking after a rather special nest up in GM land. We gather that last time round, a 7 MHz dipole was put up and left, and our eternal optimist reckons to use it this time for some contacts!

On Ten, says G3NOF (Yeovil) there have been some South American openings between 1500-1900z, and Don has also noted the YU openings around 1300. He records contacts on SSB with CX1DX, EA8AMT, EA8VV, LU7HJM, PY1NEZ, PY2ZDC, PY4BA and PY7SSB.

Negative, says G4VFG (Ivybridge); Peter tried CWs with no result, and the only beacon noted was 3B8MS on March 13 at 1400z — but there were some local contacts in G.

Top Band

Your scribe had hoped to be able to talk to the Top Band types at the NEC, but circumstances forced a last-minute non-attendance. What I really wanted to do was to talk to the 'regulars' about the way the band is being used nowadays. One of the prime moans is the eternal one of running over-power. Twenty years ago it was always the case that one could be satisfied that there was nothing in it but the envy of the other guy who couldn't put up a decent aerial for one reason or another. Nowadays, if one listens carefully, there is enough clear evidence of QRO; when a signal goes up by a few dB when the DX is on as compared with when he is nattering, for example, one can be pretty certain he isn't running a rotary beam. . . To add to the problem, there can be no doubt whatever that people know far more nowadays about how to set about radiating a Big Signal for a given amount of power and a given site, whereas years ago you "had a good site" and got out — or you hadn't and didn't. The third primary problem is the solid-state PA rig, particularly on SSB. In the beginning, it was accepted that an SSB linear should have all its distortion products at least 30dB down, and good engineering practice would suggest nearer 40; below 30 the spuriplaster all over other people — and the solid-state rig makers crow about 25dB down. Not so many years ago, the writer was overseeing production of an exciter that gave 45dB down close in (*i.e.* opposite sideband, carrier, and spuriplaster in this area) and better than 60dB — much better in fact — everywhere else. And it was easy to achieve and maintain. Today, we use an inherently less linear device, the transistor, and compound it by throwing away the PA tank so as to offer you a "built-in ATU" — as an expensive extra of course. There isn't a single maker to my knowledge that hasn't fallen for it. In Top Band terms, these rigs, fitted to the sort of potent aerials people can now brew up, are just a plain menace and far worse than a chap with a QRO but valved linear.

What is needed, then, is a world approach to the problem of Top Band; and for a few OTs to come out of retirement and show the youngsters how to design and build a linear output stage. Then when everyone has their bit of band integrated to everyone else's bit of band, there might just be a hope of making it a decent place to operate in again. But we must have a world approach, with integrated arrangements on power levels,

band segments, DX Windows and all the rest, built in and somehow enforceable.

However, I am getting hot beneath the editorial collar — let us turn to the two reports we have. G3BDQ (Hastings) is going to remove his aerial and do some serious modification work in order to improve its efficiency as a vertical radiator, and also spend more time on the earth-mat — in between mowing chores, of course. John has a worthwhile hint for all of us when he says he will never use the plastic-coated stranded type of wire for aerials again — waving a soldering-iron at the breaks in the middle of a snow-storm is not conducive to enthusiasm! G3BDQ's CW worked out to 4U1ITU, EA3, UA3, UA6s, T77C, UA9AHR, UA9SAD, UA9NN, UZ9AWP, W2ZZ/CT3, W4BT (at 2335z) and a new country in the shape of KP2J, in the Virgin Is.

G2HKU (Sheppeney) offers CW contacts with T77C, UP2BIP, and OK3CZA, but comments that he was a bit cross when he heard, at around midnight on March 26, a PA at S9 + 20 station butt into the shaky contact between VQ9QA and a GM. Of course the VQ9 had to give the PA a QSO if only to get him out of the way; but then the PA was crowing that he had already worked the VQ9 three times and had got the QSL card to prove that the guy was one of the 189 countries he had worked. Why the blazes the PA couldn't have shut up and let the others chase the VQ9 in peace, no one knows; but we can say that to butt-in at S9 + to a shaky 339 QSO is not only bad manners but plain liddery into the deal.

As for your poor old conductor, he managed to make the wire stay up (having had to re-erect it half way through last month's column!) and get it to load the transmitter after a fashion. Now to try for a contact or two, both CW and SSB.

Eighty

I can load the aerial up on Eighty too, but it does not seem to do me a lot of good . . . but I'll keep on trying!

On this band, G3BDQ offers just one SSB contact, this one being with JW0A.

CW for G2HKU was the prime mode; the Big Rig was used to tackle W2ZZ/CT3, VE3BCH, W1CFZ, ZL1AZE and ZL4IE, while the QRP CW managed a two-way with GM4UGN/A who was also using four watts near Fort William.

Turning to G4VDX (Preston) we find Joe has been on this band but has returned to his favourite 10 MHz now. Basically the reason was the Howes QRP rig — building it first, and then trying it out in conjunction with the FT-107 as the receiver. No details of the results, though.

G3ZPF (Kingswinford) says he found the skip all wrong for inter-G working so he has only worked a few Europeans. Perhaps the pick of the crop was EA8AYR, and David says that despite his

5BDXCC collection of QSLs, he hasn't yet got one from EA8 . . . hope springs eternal! The Wonder Wire has now been altered back to Eighty again, and there are noises about Twenty too.

Forty

UH8EAP is noted by G3BDQ on CW.

Turning to G2HKU we find Ted working on CW with VK2APK, VK2BAT, ZL4AW and HB0/DF2PI.

Your columnist has to admit, with head hanging, that so far none of his collection of ATUs has been amenable to persuading the Best Bent Wire to perform on this band, although I have managed to use quite a bit of old coax cable as capacitors — the trouble is in sweeping up the trimmings after the exercise has been completed! Seriously, I do seem somehow to have obtained a length which objects to being offered any of the usual ATU circuits, and it has got to the stage where either the wire or your scribe wins the battle. . . .

Odds

Our strictures on the 6T1YP and 6T2MG signals as possible phoneys are taken up by G3NOF, who says he has QSLs from both these two, worked on 21 MHz SSB. It's nice to have a doubt removed, these days!

The new editor of *The DX Bulletin* turns out to be Chod Harris, VP2ML; and we suspect that the VP2M activity will rise while he is editor, as *TDXB* now advertises the "Last Resort" on Monserrat as rental cottage and ham shack — if you like the idea, ring *TDXB* at (707) 523-1001 (plus the international code as applicable of course) and ask for the details — but don't forget this is VP2ML's California number and allow enough for the time-difference.

Still with *TDXB*, we have it that ZK3RW arrived on schedule for the one-month stay in Tokelaus, and no doubt the keen ones will have found some way of getting over, albeit with some difficulty.

The activity in China is definitely growing, and how nice it is to see it. One of the latest operators at BY5RF is a YL, Ruan, who teaches English and is keen enough to ride to the station at 0100z to practice her English on the DX-ers.

We had been wondering why we hadn't heard much of ON4UN last winter; now we know. He's been finishing a new book and working on some computer programs for aerial design application. The note about this in *TDXB* also indicates that ON4UN is now up to 321C *confirmed* on Eighty!

We had to chuckle at the affair of ZA3DUD who was, not surprisingly, a phoney; but W1NH was optimist enough to send a QSL which at least came back with an Albanian postmark on it — are we into half-credits for DXCC yet?

Talking of DXCC, we must discuss G3ZPF's letter. David has just gathered

together the full crop of cards for a 5BDXCC and is waiting the word from ARRL on the cost before getting a banker's draft organised. David reckons getting the cards in alone has cost him a fortune, and makes a case for not requiring QSLs for award submissions, as follows:

NO QSLs required, just a witnessed statement *except* for where a country has no indigenous amateur population when the DX-pedition can simply send log copies to the award authority. The reasons are:

1. The amount of paper shuffling around the world. Also, most people have one set of QSLs that they prize, and another which are meaningless except in terms of award credit.

2. Ever-increasing postage costs and the exorbitant rate for IRCs. Also the increasing amounts of post that 'goes astray' especially in the banana republics.

3. The man-hours tied up for the DX station in just dealing with the QSLs, not to mention the *cost* to him.

"CDXN" deadlines for the next three months:

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

please be sure to note these dates

4. Possession of the QSL doesn't prove that any contact took place. Say, for instance you wanted a VK QSL, and printed one for yourself: so long as the *details* looked plausible it would almost certainly pass muster. (And your scribe could add he has almost a DXCC of *blank* cards sent to him by various expeditions!)

5. Honour Roll status would not be impugned, because to get to that level you'd have to work most of the DX-peditions — hence the requirement for log copies from DX-peditions.

6. Even people having a genuine QSL can have got it by way of the 'old pals act' by making a theoretical QSO through a third party — thus the QSL 'proof' is little more than a joke.

7. The situation as regards people operating /-somewhere doesn't change because the DXCC desk checks on them anyway.

8. The question of Phoney Fred could be a problem, but even there the grapevine usually advises when one is around who is, shall we say, not kosher. However, this needn't be too much of a difficulty since Fred usually picks himself a rare country. In fact it might deter him a little at that.

So, there is the suggestion, coming from a man who has a full set of cards for his 5BDXCC, so you can't call it sour grapes. Comments?

New Bands

G3ZPF of course put his shiny new rig to work on the band, and reckons it is largely a Sunday-morning show, although one early-morning listen did produce a hearing of VK3XU — but he got away!

G4VDX says he has now got some 39 countries worked, including at least a VK, the result of early rising — but still G4VDX was late for work! On a different tack, G4VDX notes that the RSGB's 10 MHz Table has been dropped and regrets this — Joe thinks its a fine band. However, we can hardly blame G3FKM for dropping something that wasn't getting the support. G4VDX notes from his log lots of EU stations, plus WD2YOF, KY9L, W1AQE, VK2BKH, W2GW, W2FJ, W2GDV, J6LAD/9Y4, VE1ATJ, W8MT, N4UH, 9M2FZ and 9J2BO; the 9M2 was believed to be making his first QSO on the band. Gotaways included ZL4RD and PZ1DV, so the score is now 39C — but Joe adds that G3IGW has 101!

G2HKU offers just one contact on this band — CW to VK2YK.

Fifteen

G3NOF comments that he heard nothing from the Pacific or Asia during the month; however the short path to Indonesia was good between noon and 1400z, with a few 4S7, VU, AP and VK signals between 1100-1300, while the Africans have been around between 1400 and 1800z, starting with the ZSs and working north. No West Coast Ws were heard, but in terms of QSOs there were sideband contacts with AP2P, CE3DNP, CESQD, CE6EZ, CX1DX, D68WS, DJ2OW/4S7, FG5DL/FS (St. Barthelemy), G4DUW/DU1, G4WMP/ZS6, H5AQ, J73LC, JY8GO, KA5W, KB4EPK/5NO, KP4BZ, LUIJNZ, N4MJH/4X4, N5AU, NP4CC, OD5AS, PJ2FR, PYs, TR0A, TU2PX, UL7LWA, VP8VK, VP8WA, VQ3CE, VQ9SK, Ws, WB8YUC/VP2M, XT2BS, YB3CDL, YC2CRG, YC3BXK/8, YC3NCR, YC8TR, YC0BNA, YC0CLQ, YC0DWY, YC0DNK, YC0FDW, YC0HOB, YC0IIU YE0X, Z23JO, ZC4AP, ZS1VL, ZS2HH, ZS3B, ZS6AFM, ZS6AHC, ZS6AIB, ZS6BBY, ZS6CDJ, 3G3DX (=CE), 3X0HSH, 5N8AFE, 7P8CM, 9J2LC and 9L1IIS.

Just one CW contact for G2HKU, with ZS6ME.

G4VFG reckons the band was patchy at best, but in its best moments Peter made CW get over to ZS5BK and 5Z4DV on SSB. In the previous month, he noted a couple of VEs signing /VP2M and wonders why so many VP2Ms are on — if he reads this far he will know!

G4ZZG notes that when he isn't on Ten



South Midlands Communications Ltd. of Southampton are marketing a new military-style HF manpack radio. Designated FT-70 it is available in two variations, both of which operate over the range 2-30 MHz with a 10-watt output; transmission modes are SSB (USB and LSB), CW and A3H. The FT-70 is designed to be operated in adverse weather conditions, with splash-proof covers on toggle switches and weather seals fitted to rotary controls and outlet sockets. The FT-70F variant has 11 diode-programmable channels and the FT-70G version has frequency selection by twelve touch buttons; optional accessories include a charger, ATU and canvas carrying bag. An optional 50/100W PA stage is undergoing tests and should be available soon. For further information contact Mr. K. Diamond on Southampton (0703) 867333.

he is usually oblast hunting on Twenty with ten watts.

Twenty

Supposed to be where it all happens, but this month most people have gone all coy about their doings. G3NOF found nothing from the Pacific on the long path, although the JAs have been there around 0800 plus a few ZLs. The VKs were missing for most of March but were re-appearing at the time he wrote. Africans were about between 1700 to 2000, and North Americans between 1130 and 2300, with the odd West Coast station about 1600, while the South Americans appeared between 2000-2300z. SSB contacts were made with AI5P/TF, C53FG, JA4FWM, JA4KFA, JH5EEE/JD1 (Minami Torishima), JL3TWE, KB6SV, KD7CL, KW7Y, N7TT, N0OI (Colorado), PJ9MS (ex-5N2AMS and many things beside), ON7IP/ST2, TR8SA, TZ6FS, VE2PAB/4U (=YK), VE4FA, VE6BBI, VE6BE, VE6CU, VE6OM, VE7DGI, VE7EV, VE7XA, VK4OX, VP2EZ, VP2MO, VP9IM, WA7ECU, ZF1MM, ZL2AKB, ZS3E, ZS6HR and 5H3ED.

G3ZPF doesn't mention actually having worked anything, but he is actively threatening to become active on the band again, now he has all the 5BDXCC cards collected up.

We were amused by G4VDX — he says the reason he hasn't completed DXCC yet is simply that he spends too much time on 10 MHz!

Twenty SSB yielded ZL3FV, JA8YGU and 9H1EL for G2HKU, while a change of

mode to CW resulted in him latching on to VE3HO/VP2M, UW9OO, UI9LWA, UQ2GFD, ZS5WT, 9J2LC, OX3MV, UA1OT (Franz Josef Land) and OH8PF/EA8.

On the evening prior to his letter, G3BDQ tuned up on 14 MHz CW for the first time since last summer; in just half an hour John made it to VE6CSJ, 5H3ZO and ZD8AL.

In the first three weeks of the period Twenty was very good to G4VFG; Peter has discarded the Europeans from his list leaving SSB to CN8LI, ZL4OD, W4GXT, 7X5BK, VE1CBK, 9M2DF, W3MA, VP8WTW, 9J2LC (QSL to Yasme), VP2MCG, 9H1HZ, 9K2RA, 4Z4LX, PP7BA and UL7GA; as he says, there's DX to be worked by the 'dipole plus 100 watts' brigade after all!

Finale

There you have it for another month, as seen through the eyes of the reporters. For next time, and for the future, please note the deadline — a day earlier than in the past, to allow for the slow time of the posts between Welwyn and your scribe. So far the Post Office has only once succeeded in delivering a letter between us on the day after posting — to say nothing of the packet of CDXN mail which was totally lost a couple or so months back!

Send your reports, ideas and comments to, as always, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ — and the more the merrier.

Meantime, for your scribe, no gardening — it's blizzarding outside!

• • • "Practically Yours" • • •

with GLEN ROSS, G8MWR

ONE of the more interesting aspects of our hobby is that, unless you are simply an appliance operator, you are bound to acquire skills in other areas. For instance, if you build your own equipment then you are going to have to get involved in some mechanical engineering. This might simply be bending up a small case in which to build a piece of equipment or, at the other extreme, building your own tower. All these activities require the use of fasteners of some type or another and this is an area in which the amateur can rapidly get out of his depth if he is not careful. This occurs not only in the use of them but also in the purchasing of the bits he needs.

As one example of the problems you can face you will find that what you call 'a bolt' and what the supplier means by 'a bolt' are not necessarily the same thing. Most amateurs tend to think of a bolt as being threaded right along its length but this is known in the trade as a set screw, a true bolt only having a thread along part of the shank. You will also be offered a choice of different sizing systems such as Metric, BSF, UNC, UNF, BSW and BA and of different heads such as hexagonal, round, cheesehead and countersunk to name but a few. Then as a final point you will be offered a choice of material: steel, brass, etc., until you become utterly confused and probably make a run for home.

Threads

The choice between fine and coarse threads depends upon the use you have for the fastening. Consider a thread as being a

continuous wedge wound round a cylinder. A thin wedge is capable of exerting greater pressure than a thick one and also, due to the much higher amount of friction present, it is also much less likely to slip. The same applies to threads and means that a fine thread can exert much more pressure than a coarse one, so holding the separate components more firmly, and is also less likely to loosen in use. This point would be particularly important in the construction of a tower. The main drawback is that the finer the threads are cut the weaker they become so usually a trade off is required between conflicting requirements. A fine thread will usually be perfectly satisfactory if used in steel but if the thread is being cut into a soft metal like aluminium then a coarser thread should be used.

Drilling and Tapping

When cutting a thread into metal one should ideally use three taps: a taper, second and plug. If you are working in thin metal you can get away with using just the taper but in material 0.25 inch or over then all three should be used. Having decided on the size of thread to be cut determine the appropriate drill size. A table is given showing the sizes for commonly used thread sizes. If you are using a different classification of thread the drill size needed is theoretically the core size of the nut but in practice this will give a thread that is much too tight. It is usual to select a drill that will not quite pass through the nut. It is important to remember that if you are cutting a blind hole you must drill somewhat deeper than the length of the thread you are going to use so as to allow for the conical shape of the end of the hole.

The tap should be fitted into a suitable "T" handle and the tapered end inserted into the hole. Before starting to cut the thread make sure that the tap is at right angles to the material. This can be done by sighting from two sides or, more accurately, by using a set square. If you try to wind the tap straight in you will probably break the tap. Turn the tap in a turn and then back off half a turn to break the swarf. Continue this action until the thread is complete. You should always use a lubricant, either a little light oil or in emergency some grease.

External Threads

These are cut using a die of the appropriate size mounted in a handle. Usually the die will have a split in it and the holder has three screws. Two of these are used for holding the die and the third is positioned so that its pointed end goes into the slot in the die and provides a method of adjusting the size of the die. The starting threads on the die are chamfered to assist starting the thread but most people find it helpful to chamfer slightly the leading edge of the material to be threaded. It is essential to keep the die square to the work and the first cuts should be done with the adjusting screw well in so as to give a shallow cut. This should be followed with two or three cuts with the adjusting screw turned to give a deeper cut each time until the full depth of the thread has been achieved. Do not forget to lubricate the material as the thread is being cut.

A point often neglected by constructors is the use of suitable washers or shakeproof fastenings such as nylon loaded nuts. These should always be used to give a satisfactory finish and security to your work.

Size	Pitch	Drill dia.
1.0	0.25	0.75
1.1	0.25	0.85
1.2	0.25	0.95
1.4	0.30	1.10
1.6	0.35	1.25
1.8	0.35	1.45
2.0	0.40	1.60
2.2	0.45	1.75
2.5	0.45	2.05
3.0	0.50	2.50
3.5	0.60	2.90
4.0	0.70	3.30
4.5	0.75	3.70
5.0	0.80	4.20
6.0	1.00	5.00
7.0	1.00	6.00
8.0	1.25	6.80
9.0	1.25	7.80
10.0	1.50	8.50
11.0	1.50	9.50
12.0	1.75	10.20
14.0	2.00	12.00
16.0	2.00	14.00
18.0	2.50	15.50
20.0	2.50	17.50
22.0	2.50	19.50
24.0	3.00	21.00

Tapping drill size, I.S.O. metric threads (all dimensions in mm.).

The G3ISD Low-Cost Linear Amplifier

Part 2

using readily available components

E. J. HATCH, C. Eng., FIEE, G3ISD

Construction

Because of the weight and size of the PSU components, the power supply and amplifier proper are built as separate units. There is a 'master' mains switch on the PSU, and separate LT and HT switches on the amplifier. Unless the PSU can be placed out of harms way, *i.e.* on a high shelf, it must be fitted with a cover in the same way as the amplifier. The two units are coupled together using 6 or 8-way Painton ("miniature Jones") plugs and sockets, except for the high tension (2000v.) connection where coaxial cable and connectors are used.

Many of the construction details are visible in the photographs which are to be preferred to voluminous descriptive matter. Physically the assembly consists of front and back panels of 10 s.w.g. aluminium (approx. $\frac{1}{8}$ "), $8\frac{3}{4}$ " high. The rear panel is $12\frac{1}{4}$ " long and the front one is 13" long, and together with a chassis of 18 s.w.g. 12" \times 6" \times $2\frac{1}{2}$ ", all are mounted on a sub-frame of $\frac{1}{2}$ " \times $\frac{1}{2}$ " \times $\frac{1}{16}$ " aluminium angle. The latter is one of the most useful constructional materials I have come across, and is fairly inexpensive. There is also an 'apron' plate between the front panel and the front of the chassis, and below the panel mounted components. Finally, there is a stiffening piece at each side between the front panel and the chassis. The chassis and panels are held together with 4BA and 6BA screws and nuts as appropriate, and the whole assembly is strong and rigid. The overall perforated metal screen is screwed to the $\frac{1}{2}$ " angle at the top and sides of the front and rear panels. The 'screen' in the

middle of the chassis is not intended as such, but is rather a baffle to encourage the extracted air to flow past the valves and RFC1. It also acts as a support for the perforated cover.

This method of construction, although perhaps unusual, is not original; its use enables the major panel components to be mounted at a lower level than would otherwise be the case, resulting in a lower overall amplifier height. The end result is quite pleasing, as can be seen from the photographs. The use of a substantial rear panel also provides a firm mounting for the extractor fan, which running on approximately half rated voltage, does an excellent job in almost total silence.

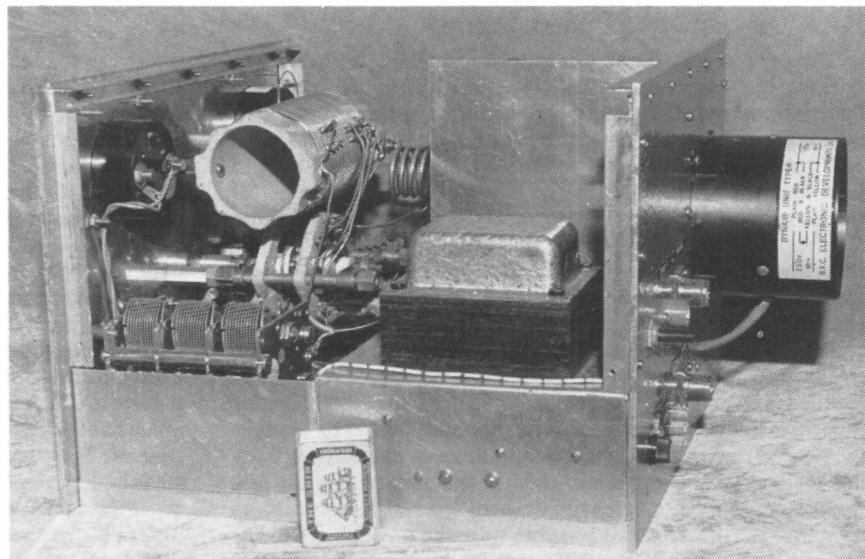
The valve sockets are recessed below the chassis so that the tops of the valve base shells are level with the chassis surface. The shells must be earthed, and if the holes are cut with minimum clearance, this will be achieved automatically. The disposition of most below-chassis components can be seen in the photographs and needs little explanation.

The filament choke is suspended in the wiring with short leads to the valve sockets at one end, and on to short stand-off insulators at the other.

The small transformer at the end of the chassis remote from the valve sockets is for the relay supply; the antenna/control relay is visible on the back wall of the chassis, and next to it is the bias network on Veroboard.

The input coils, the input bandchange switch, and associated fixed and pre-set capacitors, occupy most of the space on the front

Right side



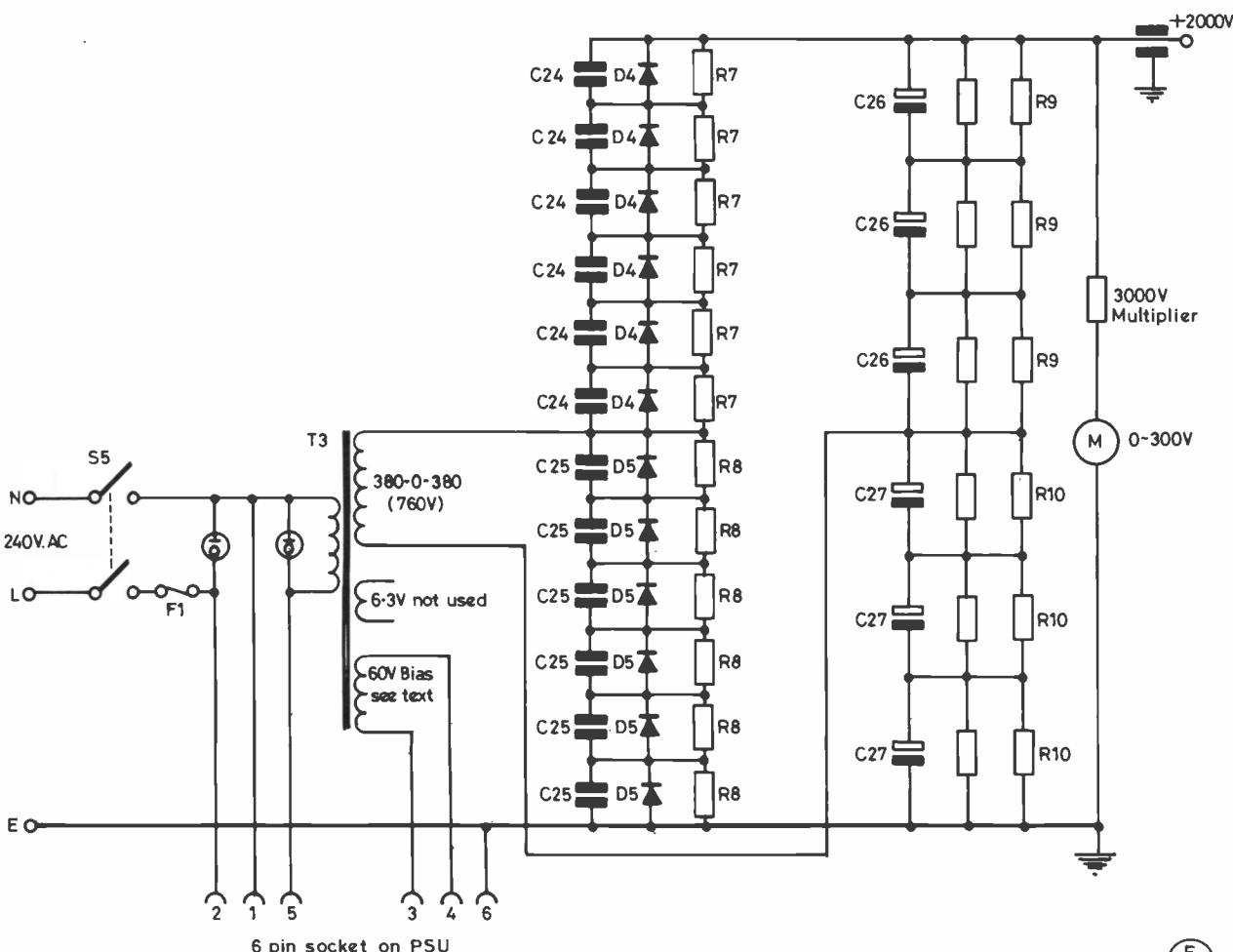


Fig. 2 POWER SUPPLY UNIT (See text re. HT and Bias windings)

(E 680)

drop of the chassis. The compression mica trimmer capacitors are designed for single hole fixing and are conveniently mounted in two rows, one on either side of the bandswitch, on aluminium angle. They bear the name "Cyldon", which is, or perhaps was, the trade mark of Sydney S. Bird and Sons, at one time of Enfield, Middlesex. Those used were obtained in used condition at rallies, but they appear to be identical with the 500pF units in the Maplin and RS Components catalogues.

The Power Supply

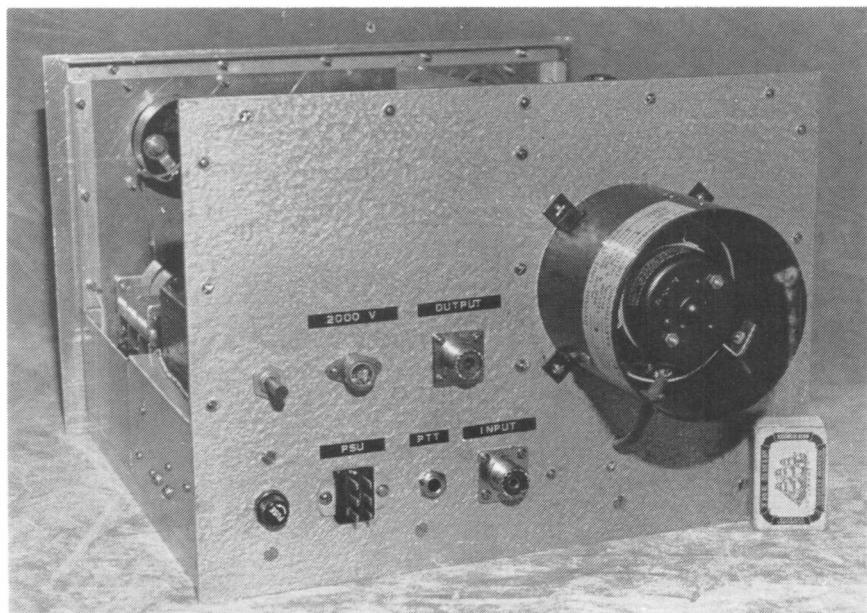
In many respects, the power supply is the simplest part of the project, but because of the probable need to use available materials, the only thing that can be specified with any certainty is the output voltage. Even so, there is no need to insist on a hard and fast value, and on-load voltages of, say, between 1900 and 2300 volts are acceptable.

The key to the PSU is of course, the transformer, and more than anything else it is a matter of recognising the potential of whatever comes to hand. Transformers are usually marked with their voltage, and even when not, it is easily measured. Uncertainty arises because the current rating often is not given, and in any case would depend on the type of load for which the transformer was originally designed. That may have been AC, or rectified AC, and if the latter whether for resistive, inductive, or capacitive loads. The situation is further complicated by whether the transformer was designed for continuous or intermittent load. For instance, the transformer used in this project has the HT winding rated at "1.3 Amps Intermittent", which has no definite meaning. Fortunately it is possible to make a rough, but near enough, assessment of a transformer for our purposes from its

size and weight, since these are a measure of the amount of active material (laminations and copper) present. Providing the voltage ratio is usable, a suitable transformer would be a minimum of, say, 5 to 6 inches cube, and weigh a minimum of say, 15 to 20 pounds. Needless to say, this cannot be other than a rough guide but it has worked well in practice, and is derived from a very useful graph of weight/rating for different classes of duty, which appears in [3]. Even this guide appears to be generous, as the 17-pound transformer used is barely warm after an hour's QSO. For a bridge rectifier, a suitable transformer would have a secondary voltage of between 1400 and 1600 volts (or 700-0-700 to 800-0-800). When a voltage doubler rectifier is used, these become 700 to 800 (or 350-0-350 to 400-0-400); in the case of the bracketed figures, the centre tap is not connected of course. These estimated ratings should hold good when there is only the one HT winding on the transformer, and any LT windings are not loaded.

Fig. 2 shows the PSU built for this amplifier. The voltage doubler uses a total of twelve 1N4006 (800 PIV) diodes, each shunted by a $0.01\mu\text{F}$ 1000 volt disc capacitor and a 2.2M 1-watt resistor, and a total of six $700\mu\text{F}$ 400v. computer-type electrolytic capacitors, each shunted by two 330K 1-watt resistors in parallel. This number of diodes gives a safety factor in excess of 100%, and is well justified in view of their low cost. The diode shunt resistors at 2.2M are higher in value than the usual 0.47M or thereabouts, which has the desirable effect of raising the HT voltage by a useful amount. The purpose of these resistors is, of course, to distribute the total PIV reasonably equally across the diode string, and this would be achieved if the shunt resistance is no more than, say, 10% of the minimum individual diode reverse resistance. For 800 PIV diodes the latter will be $800/10\mu\text{A} = 80\text{M}$. ($10\mu\text{A}$ is the

Rear view



specification maximum leakage current at the diode PIV). Since 2.2M is only 2.75% of 80M, it is clear that effective PIV distribution will be achieved.

The equivalent reservoir capacitance is $700/6 = 117\mu F$, which is higher than usual or necessary, but the capacitors were available at low cost, and there is no disadvantage in the higher value as we shall see — even though it is customary to see an equivalent capacitance of around $20-25\mu F$ in this application. The overall voltage rating of the capacitors is $6 \times 400 = 2400$ volts giving an acceptable margin; these capacitors were available at many of the 1984 rallies. A friend pointed out that the date code was 1972, which implied that they were past their best; however, after preconditioning, the leakage current of all six was less than one third of the specification maximum of 1.6mA (at 400v.).

It is interesting to consider the performance of the power supply in relation to the diode ratings and the amount of capacitance used. One thing to emerge is that special means to limit switch-on current to protect the diodes is not necessary, at least in this instance, as the surge is well within the diode ratings. The diode ratings concerned are as follows: 1. Non-repetitive peak current rating 30 amps; 2. Repetitive peak current rating 6 amps. (Don't confuse these with the average DC load current rating of 1 amp.)

Clearly the switch-on peak current would be $= E_{pk}/\text{source impedance}$ ($E_{pk} = E_{sec} \times 2$) as the discharged capacitors are equivalent to a short circuit. As an approximation, the source impedance can be taken to be the transformer equivalent resistance referred to the secondary as follows:

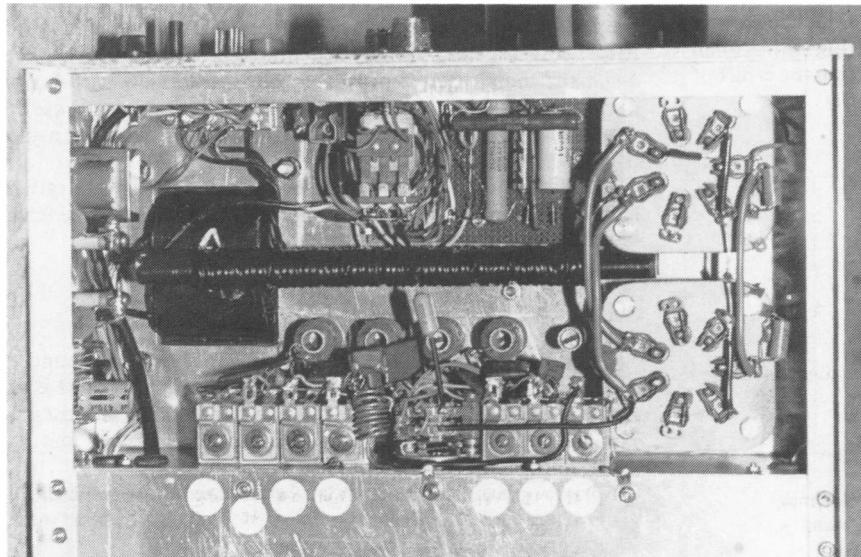
$$(\text{primary resistance} \times \text{ratio}^2) + \text{secondary resistance}.$$

For the transformer used, this worked out as follows:

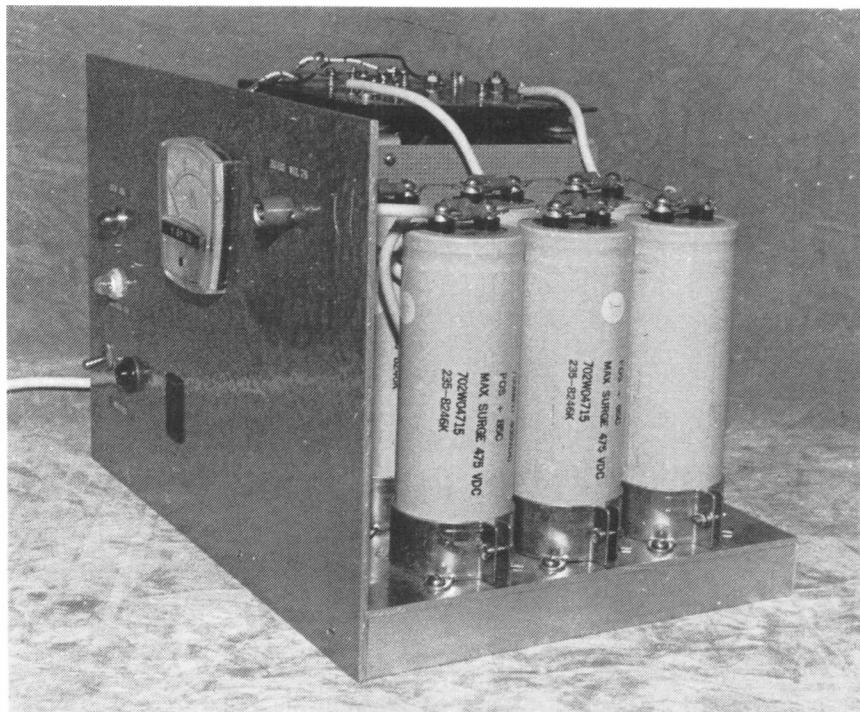
$$2.3 \text{ ohms} \times \left(\frac{760 \text{ volts}}{240 \text{ volts}} \right)^2 + 27 \text{ ohms} = 50 \text{ ohms},$$

so that the peak surge current $= \frac{760 \times \sqrt{2}}{50} = 21.5$ amps, which

is well within the limit of 30 amps. This would be lower in practice as the diode impedance and transformer leakage reactance have been neglected in this calculation. Reference to [6] shows that under the same conditions, the repetitive peak current is 4 amps compared with the rating of 6 amps, again within rating, even with the $117\mu F$ of capacitance. Further reference to the same source shows that the static regulation is much the same for either 25 or $117\mu F$. As would be expected, it is with regard to ripple values that



Under-chassis view



the difference in capacitance is most marked, being approximately 0.5% for $117\mu\text{F}$ and approximately 2.5% for $25\mu\text{F}$. Since 5% is generally considered acceptable, it is apparent that 20 to $25\mu\text{F}$ would be adequate, and this is borne out by examination of the circuit diagrams of several commercial amplifiers.

Having justified the use of moderate levels of smoothing capacitance, it must be admitted that the use of higher values would improve the *dynamic* regulation, with consequent improvement of the transmitted signal. The unusually high value of $117\mu\text{F}$ employed here may account for the reports of excellent signal quality received from regular contacts.

Initial Adjustment and Operation

After all components have been mounted and wiring installed, all connections must be carefully checked. Also ensure that the filament voltage at the valve sockets is ten volts, because of the volt drop in the filament choke. Check also the relay supply voltage, relay operation, and the bias circuits. When that is done, the input circuits must be aligned and the output tank optimum tappings must be selected, starting by connecting the exciter transceiver to the input and a 50-ohm dummy load to the output. To attempt to describe the process step-by-step would be tedious and repetitive, but by proceeding carefully, starting with a small amount of drive, watching the meters and observing the effect of

making adjustments, the task is gradually accomplished. Briefly described, it is best first to ensure tank circuit resonance on each band to be aligned (not necessarily the optimum tap at this stage), using a GDO. The relevant input circuit is then aligned, tuning for maximum grid current, and the process is repeated for each band. The optimum tank tapping for each band is that which results in resonance at or close to the capacitor values in Table 2B. For the capacitors, coils, and tappings used, the settings are as Table 3, where 100° represents minimum capacity.

Operation simply consists of tuning for maximum output and either talking the anode current up to about 150mA (representing a true peak of about 300mA), assuming an HT supply of 2000 volts, or preferably talk it up to about 200 watts on an output meter (representing about 400 watts peak).

Trouble-Shooting and TVI

The prospective constructor may normally expect to encounter problems of one sort or another in almost any project other than the simplest, but surprisingly, apart from adjustments involving the input and anode coils, no snags occurred during the construction of this amplifier. Anti-parasitic chokes have not been fitted in the anode connections because they were not found to be necessary, but they may be required in some cases [1]. Once again the monitorscope proved to be an extremely useful tool during construction and testing, as well as for its primary use of continuous monitoring of the transmission in order to avoid overdriving the amplifier.

Happily, TVI caused by harmonic radiation seems to be rather a think of the past, and both domestic TV receivers are free from interference.

Conclusion

Providing one is prepared to take time in shopping around at club junk sales and at rallies in order to collect parts, there is no doubt that an HF linear can be made at a fraction of the cost of a commercial model, the only sacrifice being the loss of compactness that an integral PSU would give.

Thanks are due to the friends who donated one or two of the parts used, and also to Bernie Thompson, G6TXB, who made such a good job of the photographs.

Table 3. C1 and C2 settings (100° is minimum capacitance). These settings were obtained using a 50-ohm dummy load and are for guidance only.

Freq.	C1 (degrees)	C2
3.5	20	25
3.8	35	40
7.0	70	43
10.0	90	40
14.0	70	30
18.0	85	60
21.0	70	60
28.0	80	60

APPENDIX 1

Anode Choke Construction:

Total of 220 turns of 34 s.w.g. enamelled copper wire close wound on a $\frac{1}{8}$ " \times $4\frac{1}{2}$ " former, sectioned as follows: 145 turns, 30 turns, 30 turns, and 15 turns with $\frac{1}{8}$ " between sections, except that the top (15 turn) section is spaced $\frac{3}{16}$ ". The 145 turn section is the HT end. When tested, the choke exhibited the following series resonances, none of which has given rise to any problems: 13.5 MHz, 17.0 MHz, 22.9 MHz, and 26.1 MHz.

APPENDIX 2

Tank Coil Details:

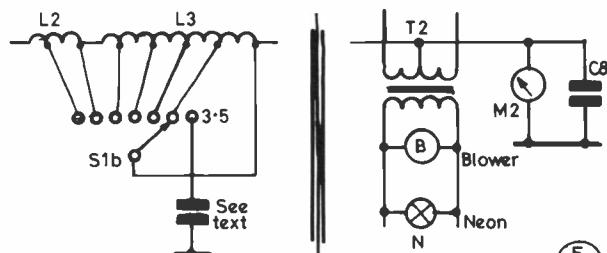
- L3. Full winding, 26 turns of 16 s.w.g. tinned copper wire on "Eddystone" type 2.5" ribbed and grooved ceramic former. Tapped at 2 turns for 18 MHz, 3 turns for 14 MHz, 7 turns for 10 MHz, and 9 turns for 7 MHz. The end 8 turns at the 3.5 MHz end are not required and are permanently short-circuited.
- L2. Self-supporting coil consisting of 7 turns of 10 s.w.g. tinned copper wire tapped at 4 turns for 28 MHz. The internal diameter is one inch, and turn spacing is equivalent to conductor diameter.

(There appear to be two variations of the "Eddystone" former, one with a total of 26 turns, as used here, and one with a total of 23 turns, both over a length of $3\frac{1}{2}$ ". Either would be suitable but the latter may involve some adjustment of taps.)

- (4). "Kilowatt grounded-grid linear amplifier with paralleled GL-813's", *GE Ham News, Sideband Handbook*, 1st Edition, 1961. (U.S.A.).
- (5). *The Radio Amateur's Handbook*, 1982 Edition, ARRL. (U.S.A.).
- (6). *Radio Designer's Handbook*, F. Langford-Smith, 4th Edition, 1953, Iliffe & Sons Ltd. (Chapter 30, "Rectification".)

Correction to Part 1

Corrections are required for Fig. 1 on page 21 of the March issue, which contained Part 1 of this article: diagrams showing the necessary corrections are shown below. Also, omissions from the Table of Values (which covers Fig. 2 as well as Fig. 1) on the same page were: $C_2 = 450/500\text{pF}$ per section; $V_1, V_2 = 813$; $F_1 = 250\text{V}$, 7.5A ; $FS_2 = 250\text{V}$, 3A ; the specifications for the meters M1 and M2 should be transposed. Note that a blower should be connected across the primary of T_2 .



Corrections to Fig. 1 p. 21 March 1986 issue

E
714*References:*

- (1). "A low-budget HF linear amplifier" E. J. Hatch, G3ISD, *RadCom*, May 1982.
- (2). "Follow-up to the low-budget HF linear amplifier", E. J. Hatch, G3ISD, *RadCom*, September 1984.
- (3). *Radio Handbook*, 22nd Edition, 1981, Howard W. Sams & Co. Inc. (U.S.A.)

CLUBS ROUNDUP

By "Club Secretary"

THREE is again a large crop of mail this month, so let's get on with it!

At **Abergavenny & Nevill Hall** the regular meetings are on Thursday evenings in the room above Male Ward 2 at Pen-y-Fal Hospital, Abergavenny; the first Thursday in the month is video night and there are Morse and RAE classes too.

Acton, Brentford & Chiswick will be gathering on May 20 to see a demonstration of G4HMC's new DSB/CW QRP rig for Top Band; the venue is Chiswick Town Hall, Chiswick High Road, London, and the start at 7.30 p.m.

Next **Basingstoke** and this means Forest Ring Community Centre, Sycamore Way, Winklebury, on the first Monday of each month; May 5 is a talk by G3CBU on home construction, and on June 2 they are preparing for VHF NFD. More details from the Hon. Sec.—see Panel for his details.

May 4 is the date for the **BATC Annual Television Rally**, at Crick Post House, with talk-in on S22, SU8 and GB3ME—but it

should be easy to find Junction 18 of the M1 and the Post House is close by. Start at 10.30 a.m.

The **Bath** group is based at the Englishcombe Inn, Englishcombe Lane, Bath, and they go there on alternate Wednesdays. More details from the Hon. Sec.—see Panel.

Now **Biggin Hill** where the new Hq is at the Village Hall, Downe, Kent, and the group have it booked on May 20, for an amateur radio quiz.

The Isle of Wight now, and the **Binstead** group; every Wednesday they are at the Scout Hq, Drill Hall Lane, Binstead, where they have their own shack and all sorts of activities set up. Why not pay them a visit?

Bishops Stortford members have their 'third Mondays' booked at the British Legion in Windhill, but they also foregather on most Thursday evenings in the saloon bar of the "Nags Head", on the Dunmow Road. Details from the Hon. Sec.—see Panel.

On the first and third Friday the **Borders** gang is to be found at the Tweed View Hotel, Berwick-on-Tweed, Northumberland. Programme details from the Hon. Sec.—see Panel.

The **Borehamwood** group has the third Monday of every month booked at "The Wellington", at the Elstree station end of Theobald Street, Borehamwood—again we refer you to the Hon. Sec. for the latest programme details.

At **City of Bristol RSGB** the normal meetings are on the last Monday of the month, unless that happens to fall on a Bank Holiday, in which case the meeting is pulled forward a week. May 19 is a talk by G3XTT about HF DX (and who better?) May 25 is

an extra one by way of a mobile picnic. Meetings are at the Small Lecture Theatre, University of Bristol, University Walk, Clifton, Bristol.

New Venue

Bromsgrove Radio Society has changed its Hq and is now to be found at Aston Fields Working Men's Club, Stoke Road, Bromsgrove. On May 13 they are there for the AGM, and on May 27 there is an informal; June 10 is a lecture.

May 13 is film show night for **Bury** and details were to be sent on when finalised; but we do know the venue to be the Mosses Community Centre, Cecil Street, Bury, and that in fact they are there every Friday evening.

Stanton Room, Charlton Kings Library, Cheltenham is the home of the **Cheltenham** club. They have a treasure hunt down for Sunday May 4, and on May 16 they have a talk and demonstration by G4UAZ on test gear.

The **Chesham** group has its place in the Stable Loft, Bury Farm, Pednor Road, Chesham, on Wednesday evenings; the entertainment varies from the monthly formals with a speaker, and monthly general meetings down to natter sessions, and there is now a developing interest in contesting. Details from the Hon. Sec.—see Panel.

Turning to **Cheshunt**, they seem to have settled that they are staying in the current Hq, and hence improvements are in the wind. They can be found at Church Room, Church Lane, Wormley, near Cheshunt, every Wednesday evening.

The **Chester** club has its home at Chester Rugby Union Football Club, Hare Lane, Vicars Cross, and they start meetings at 8 p.m. May 6 is a committee meeting and on 13th they have a talk by GW8ICT on computer-aided design; May 20 is the outside activity evening and will be at Shepherds Houses near Frodsham, and on May 27 G4EZO talks about amateur television.

At **Chichester** the North Lodge Bar, County Hall, Chichester, is now the Hq on first and third Tuesdays. May 6 and May 20 are 'open' at the time of writing, but doubtless they will have sorted something out in good time. We note also that they are putting on a station at the Chalk Pits Museum (GB2NM), Amberley, from 1–6 June.

Down west now, to **Cornish**, and the Church Hall, Treleigh which is on the old Redruth Bypass. Find them there on the first Thursday of the month—May 1 and June 5. They also have a constructor's workshop on May 19.

The **Coventry** crew is located at Baden-Powell House, 121 St. Nicholas Street, Radford, Coventry, every Friday evening. They alternate nights-on-the-air (May 2, 14 and 30) with other activities—May 9 is FAX and packet radio by G6VHI starting at 7.40 p.m. sharp, and on May 23 they are 'playing away' at Hartshill Hayes Country Park.

Another Move

This one is by **Crawley** who will be using the Leisure Centre, Haslett Avenue, Crawley—in the bar/cafe at 1900, then the meeting proper 2000–2200. On May 7 they have a junk sale, and on May 28 they have a quiz against Mid-Sussex, at Crawley.

On May 17, G6YAF will talk to London's **Crystal Palace** gang about solder and fluxes at All Saints Parish Rooms, Upper Norwood; this is the junction of Beulah Hill and Church Road, opposite the IBA mast.

Turning to **Dartford Heath D/F** we find they have an AGM on May 2 at the Scout Hut in Broomhill Road. In addition there is the pre-hunt Tuesday meeting on May 6 at the "Horse and Groom" pub on Dartford Heath, and again on June 3.

It won't seem quite right to be writing G3KQF in the Secretaries Panel for Derby — he will be just the third incumbent since W.W.II! Looking at it that way, G2CVV and G4EYM cover the Derby Hon. Secs. 1946–1986 . . . wonder how long G3KQF will serve? Turning to the club, find them on Wednesday evenings at 119 Green Lanes, Derby, where they have the whole Top Floor to themselves.

The **Dorking** gatherings are held on the second and fourth

Tuesdays of each month at various venues; we make it May 15 for the informal at the Star and Garter Hotel, plus May 27 at "The Cock", Headley, with two-metre talk-in on S20 and S22; this is possibly because the normal Ashcombe School venue is unavailable, but we recommend a check with the Hon. Sec.—see Panel.

What is generally known as **Dover** is properly titled SE Kent YMCA — which defines their meeting place as Dover YMCA, Godwynhurst, Leyburne Road, Dover. Find them there on May 7 for a talk by the local crime prevention officer, and on 14th for a video. May 21 is a natter evening, and on 28th the members are going out — to the "Old Lantern" and Johnson-Martin Ales' brewery.

Up in Scotland we have **Dunfermline** which is in fact at Outh Wireless Station, which is about 7 miles from Dunfermline and boasts a clear take-off from 800 feet a.s.l. with all the gear to take advantage of the site, both HF and VHF. Transport is usually available from Dunfermline each Thursday evening if you contact the Hon. Sec.—see Panel for the needful data.

Now we turn to **Edgware** and Watling Community Centre, 145 Orange Hill Road, Burnt Oak. The details for May 8 was not finalised when they wrote, but on May 22 they have the Constructors' Contest and an NFD briefing. And, in the current newsletter there is an interesting article on Greylime Propagation.

The **Falkirk** letter indicates that they are at the Grange Centre on May 7 for a bring-and-buy/junk sale to which all are welcome. More details from the Hon. Sec.—see Panel.

Deadlines for "Clubs" for the next three months—

June issue—April 24th

July issue—May 29th

August issue—June 26th

September issue—July 24th

Please be sure to note these dates!

The **Fareham** group is based on Portchester Community Centre on a weekly basis; details from the Hon. Sec.—see Panel.

May 5 at **Felixstowe** is a talk on fibre-optic TV by Sam Jewell of BT Labs, and on May 19 they have a social evening; these are at "The Feathers" in the back room, the pub being located in Walton High Street.

There will be an equipment sale at **Fylde** on May 6, and on May 20 a talk about satellite TV in the U.K. Both call for a prompt start at 7.45 p.m., at the Kite Club, Blackpool Airport; the club's subscription is a joint one, giving also membership of the Kite Clubs, so you can watch the flying whenever you fancy it.

Up in **Galashiels** the main meeting is on May 14 for a demonstration of RTTY and SS-TV, by GM1JGI. In addition, they foregather at the Focus Centre, Livingstone Place, Galashiels, every Wednesday evening. Looking forward a little to the Rallies scene, theirs is on August 24, at Galashiels Rugby Club, Netherdale, and they call it an Open Day. Details from the Hon. Sec.—see Panel.

Glossop has May 29 as an activity night from Dinting Railway Centre, to see what they can radiate from a different spot — what a shame with all those nice steam engines to look at!

Now the **G-QRP Club** which is the one for the low-power enthusiasts — and we might add also for the home-constructors too, as it seems the club members like their QRP to be home-brewed too. Details from the Hon. Sec.—see Panel.

The **Grimsby** folk have their place at Cromwell Social Club in Cromwell Road, at 8 p.m.; May 1 is a talk on the use of test meters, and on May 8 they have a D/F hunt. On May 15 the topic is 'How Television Works' and on 22nd they have another D/F hunt. May 29 is a session on NFD organisation, and a natter.

Harrow is to be found at Harrow Arts Centre, High Road,

Harrow Weald, which is opposite "The Alma" pub and the bus garage (just to make sure you can find them); May 2 is an activity night and on May 9 it is the outgoing Chairman's lecture. They are in session every Friday evening.

The **Hastings** crowd seems to have thrived of late years; and you can find them at West Hill Community Centre on the third Wednesday of each month for the main meeting, plus every Friday evening for a natter at Ashdown Farm Community Centre, Downey Close, off Harrow Lane, just before the DoE.

At **Harvering** they book in to Fairkytes Arts Centre on Wednesdays — this Hq. is in Billet Lane, Hornchurch. May 7 is informal, and on 14th G4RLN will talk about developments in microwaves. May 21 is the pre-NFD briefing and on 28th G4MYO sets up a D/F hunt.

Over to Ireland now and **I.R.T.S.**, which is of course the national society for Eire. This is the group to make contact with if you are likely to want to do any operating in EI-land, or to know of local clubs. Details from the Hon. Sec.—see Panel.

Northwards to **GI** and **Lagan Valley**; they have the second Monday of each month booked at the Rathvarna Teachers Centre, Pond Park Road, Lisburn. More details from the Hon. Sec.—see Panel.

Shetland Special

Lerwick club is to put on a special-activity station signing GB0OS from the Island of Housay at long. $0^{\circ} 45.75'$, lat. $60^{\circ} 25.4'$ (the Coastguard Lookout hut), which lies in the Out Skerries group, from May 24 to June 1, operating continuously on all HF bands plus VHF/UHF, using Phone/CW/RTTY/FAX and so forth, with 60-ft. masts, beams and other aerials as weather conditions and the bands may dictate. The special QSL will come in *ten* different varieties, each depicting a different aspect of Shetland life. More details on this one — and indeed on the Lerwick club — from GM0AVR at the address in the Panel.

Now **Lincoln**, where the Hon. Sec. writes to say they are still based on the City Engineers' Club, Waterside South, Lincoln (this is in the Central Depot); every Wednesday evening, with alternation of talks and informals about sums it up, save for adding that they seem to get good speakers and topics.

At **Lothians** the gang meets at Harwell House Hotel, Ettrick Drive, Edinburgh, on the second and fourth Wednesday each month. May 14 is down for a talk, by GM3OWU on Raynet, and what it is all about.

As far as **Lough Erne** club is concerned, we are too late for their Rally on April 13, but note that it was graced by G3RJV; for details of the normal club activities we have to refer you to the Hon. Sec.—see Panel.

Turning to **Maidstone YMCA**, we find them based at the 'Y' Sportscentre, Melrose Close, where they have been for many years now. On May 2 G3ORP talks about rig conversion, and on 9th there is the RAE class and NFD meeting. May 16 is G8MWR on microwaves, for which a small admission charge will be levied. May 23 is again RAE plus NFD preparations, and on May 30 there is the AGM.

Up now to **Maltby** where the locals meet at Hellaby Community Hall, Clifford Road, Hellaby, just off junction 1 of the M18 (A631 turn-off), every Friday at 7.15 p.m.

The **Maxwelltown** group will welcome *Jaycee Electronics* from Glenrothes on May 21, as a combined 'do' with the Dumfries, Solway, and Carlisle clubs. Details from the Hon. Sec., who will also give you details on the normal meetings at the Tam o' Shanter Inn, Queensberry Street.

Next **Midland** where the members are now well ensconced at their new club address—it is Unit 5, Henstead House, Henstead Street, Birmingham B5 6HQ; try this on May 20 for a talk on modern printed circuit techniques by G8FTU; or on Friday evenings for the informals.

Back to **GI** now and **Mid-Ulster** where the monthly meeting is on the second Sunday of each month at the Guide Hall, Castle Hill, Gilford. Of course, this month sees their big event on May



Top Band portable in 1924: members of the original Wimbledon Radio Society (callsign 6JB) operating on Box Hill, Surrey, 62 years ago. The group includes G2CA (fifth from left), SWL Roland Oliver K.C. (second from right) and G6QN (kneeling centre). Equipment consisted of a Peto Scott receiver in three boxes, a rack-mounted 10-watt CW/AM transmitter employing a single grid modulated valve, powered by 400 volts from a tray of dry batteries; the 160-metre antenna was an end-fed wire slung between the trees. photo: G3ESH

18, which is the Parkanaur House Rally about six miles from Dungannon on the main Ballygally road.

On to **Morecambe Bay** and the canteen of Luneside Engineering Co., Mill Lane, Halton, near Lancaster, on Monday evenings. On May 12 G3XSN talks about RSGB, and May 28 of course is Spring Bank Holiday; the intervening Mondays are down for the Morse class.

Now to **Nene Valley**; they have their meetings at the "Prince of Wales" pub, Well Street, Finedon, Northants, starting about 8 p.m. On May 7 there is a natter night and on 14th a talk on the Ordnance Survey, but we don't have details of the other two Wednesdays of this month.

Newbury College is now the home of the **Newbury** club; on May 13 they have G4VSQ to talk on Sporadic-E.

The weekly meetings of the **North Wakefield** group are held at the "White Horse", Fall Lane, East Ardsley, starting at 8 p.m. May 1 has a talk by the local crime prevention officer. On May 8 they visit Leeds/Bradford Airport, and on 15th have a talk by G4OOC. May 22 sees them at the "Water Prince" floating restaurant and on 29th they have the monthly formal meeting.

Nottingham now, and here we are talking about Thursdays at Sherwood Community Association, Woodthorpe House, Mansfield Road, Sherwood, Nottingham. May 1 is a session of 1296 MHz to which you are to bring your gear, and on the 8th G1EUP talks on a subject of special interest. May 15 is a VHF foxhunt, and on 22nd they have an activity evening. May 29 is set aside for testing your rig with G8FWH.

The **Pembroke**shire meetings are at the Further Education Centre, Tower Hill, Haverfordwest, on Thursday evenings; we have it they also have Morse classes on Wednesdays and lots of outside activities. Details from the Hon. Sec.—see Panel.

Plymouth Albion RFC is home to the **Plymouth** group, with May 5 being a natter night, and May 19 an interesting one—Mr. Craig Rich on 'BBC Programmes'. This talk will be followed on June 2 when R. Terry and R. Melhuish will talk about 'BBC Engineering'.

The **Pontefract** gang is to be found on the top floor at Carleton Community Centre, Pontefract, every Thursday. May 1 is a committee meeting and on 8th they have a Raynet Exercise. May 15 is a natter, and on 22nd a foxhunt for the G8BVH Trophy. On June 5 they visit Spen Valley club.

Next we must mention **R.A.I.B.C.**; the full members are blind and invalid amateurs and SWLs for whom the group exists, and the others are the supporters and the representatives who make it all happen. Details from the Hon. Sec. — see Panel.

R.A.O.T.A. is the one for the old-timers; the definition of an OT is twenty-five years in the hobby, and the details will be obtainable from the Hon. Sec. — see Panel.

At **Reigate** the locals have their base at the Constitutional and

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.
- B.A.T.C.: T. Brown, G8CJS, 25 Gainsborough Drive, Adel, Leeds LS16 7PF.
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- CHELTHAM: T. Kirby, G4VXE, 29 Tivoli Road, Cheltenham, Glos. GL50 2TD. (0242 36723)
- CHESHAM: T. Wadsworth, G4SNQ, 20 Rook Wood Way, Great Missenden, Bucks. HP16 0DF. (*Gt. Missenden 2516*).
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- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Conservative Centre, Warwick Road, Redhill, Surrey. For the May meeting they are going to the M25 Police Control Centre at Godstone, but the date was to be confirmed — get the details from the Hon. Sec. at the address in the Panel.

While the first Wednesday is the main meeting at **South Birmingham** with a 'semi-volunteer speaker'(!) they are also there on Mondays for a natter, Thursdays for an HF night, and Fridays for construction, Morse and so on. All this at West Heath Community Association, Hamstead House, Fairfax Road, West Heath.

For May, **South Bristol** has, on 7th, G3OUK talking about simple HF aerial construction, and 14th is VHF activity night. May 21 is construction evening, and 28th 50 MHz activity night. Find all this in Room 3 or 4, Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol.

South Cheshire means Crewe, and the LMR Sports Club, Goddard Street; May 12 and G4APA will talk about contest working.

Although the formal meetings of the **Southdown** crowd continue to be on the first Monday of the month at Chaseley Home for Disabled Ex-Servicemen, Southcliffe, Eastbourne, they also have Tuesdays and Fridays at the Wealden Council Offices, Vicarage Fields, Hailsham, for less formal activities.

June 1 is the date for the **Southend** club rally at Rocheway Centre, Rocheway, Rochford, Essex; and this is also the venue for the regular Friday-evening club sessions. Details from the Hon. Sec. — see Panel.

The **Southgate** club has a talk by S. Wood, the Marconi Company Historian, on May 8 at their new HQ. at the Holy Trinity Church Hall, Green Lanes, Winchmore Hill, London N21.

At **Stevenage** they foregather nowadays on the first and third Tuesday at the premises of Sitec Ltd., Ridgemonde Park, Telford, Avenue; May 6 is down to a talk on HF antennas, and on May 20 there is a radio quiz.

The Robin Woods Centre is now the HQ. of the **Stourbridge** group, this being in School Street, Envile Road, Stourbridge. Try the first and third Monday each month.

The dates for the **Stroud** club are May 14 and 28; they meet on alternate Wednesdays at Nelson School, Stratford Road, Stroud, and have a programme of varied events. More details from the Hon. Sec. — see Panel.

A change of date occurs for **Surrey** when they meet on May 14 for the club Construction Contest. The normal routine is for the first and third Monday at **TS Terra Nova**, 34 The Waldrons, South Croydon.

Sutton & Cheam has a natter session on May 5 in the bar, and on May 16 they have their AGM. The venue for both is the Downs Lawn Tennis Club, Holland Avenue, Cheam.

The **Thames Valley** scribe has raised a small problem . . . we think he said 'first Tuesday' but another possible interpretation could be 'first Thursday'; but we can decode the HQ. address as being Thames Ditton Library, Watts Road; and the May subject is a discussion on EMC as it affects the radio amateur. The Hon. Sec's address is in the Panel.

At **Todmorden** the venue is quite clear: The Queen Hotel, Todmorden, on May 5 when they have G4WYT on RTTY, and again on May 19 for a practical demonstration of construction, to include hints and techniques.

Torbay has weekly meetings every Friday at 7.30 p.m. The HQ. these days is at E.C.C. Social Club, Ringslade Road, Highweek, Newton Abbot. June 27 is set aside for a talk on Winemaking by G0BAJ, and the following day they will have GB4PP on the air. More details from the Hon. Sec. — see Panel.

New One

To us, anyway. The club name is **Trafford** and it is based on the Sea Cadet Unit, Bradshaw Lane, Stretford, Manchester. Meetings are every Thursday, and on May 8 they have G1AEO to talk about PSUs and construction.

We turn now to **Vange**, covering the Basildon area; they pass on

the word that they have their Rally on September 7, at Nicholas School, Basildon, Essex. Get details on this and on the club from the Hon. Sec. — see Panel.

The R.A.F. Association's club in New Kent Road, St. Albans is host to the **Verulam** club, on May 13 for an activity evening. On May 27, G3ROO will make a personal appearance to demonstrate that he has the answer to the question "Is there Life below Forty?"

On alternate Tuesdays the **Wakefield** group is to be found at Ossett Community Centre, Prospect Road, Ossett; May 13 is a D/F aerial practice run and on May 27 they have a bring-and-buy junk sale.

If you live in the **Welwyn/Hatfield** area your local group foregathers at the 9th Welwyn Garden City Scout HQ., Knightsfield, on the first and third Monday in each month. The general rule seems to be to alternate informal/workshop sessions with lectures. Details from the Hon. Sec. — see Panel.

On Tuesday evenings the **West Middlesex** group foregather at the Drayton Court Hotel, West Ealing, London W13; they welcome visitors and have a varied programme. They had a station on at the Boat Race, and run a very successful annual Star and Garter Appeal for the disabled ex-servicemen's home of that name. More details from the Hon. Sec. — see Panel.

The dates for **Wimbledon** are May 9 for a quiz against Coulsdon club and May 30 for the Summer Bazaar. The HQ. is the St. John Ambulance HQ., 124 Kingston Road, SW19.

Now to **Wirral** — the one that is based on Ivy Farm, Arrowe Park. On May 7 they have G3XSN to talk on RSGB affairs. Saturday, May 10 is the Golden Jubilee Dinner/Dance, and on May 13 they get down to the NFD planning. Then on May 21 they have a repeat of the talk by G3UZU on regulated power supplies and their construction which was missed by so many earlier owing to bad weather.

The other **Wirral** club is to be found at Irby Cricket Club, Mill Hill Road, Irby. On May 14 they have a quiz night, and on 27th a talk by G3LEQ, Gordon Adams.

By now the **Wisbech** club special-activity affair in connection with St. George's Day will be in full swing, until May 17. The club Hon. Secretary would, we are sure, be pleased also to give you details of the meetings and the venue — see Panel for his details.

At **Wolverhampton** the locals have a place at Wolverhampton Electricity Sports Club, St. Marks Road, Chapel Ash. May 6 is the home-brew contest, and on 13th they discuss the ins and outs of PEP. May 20 is devoted to the checks to be made on an SSB rig and power measurements, and on Sunday 25 they have a VHF D/F hunt. Finally, May 27 is a night-on-the-air.

May 7 at **Worksop** is a visit to Bolsover club; on May 20 they have G3BA to talk on 'Clandestine Radio'. HQ. is at the Sub-Aqua Club, The Maltkings, Gateford Road.

Yeovil seems to have got a month ahead, but we can say that they foregather every Thursday at the Recreation Centre, Chilton Grove, Yeovil, and they usually have a speaker or some arranged activity. More details from the Hon. Sec. — see Panel.

Finally **York**, where they welcome visitors every Friday evening at the United Services Club, 61 Micklegate, York.

Finale

Whew! the bottom of another pile; deadlines are in the 'box', and are of course for the arrival of your letters, addressed as always to "Club Secretary", Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ.

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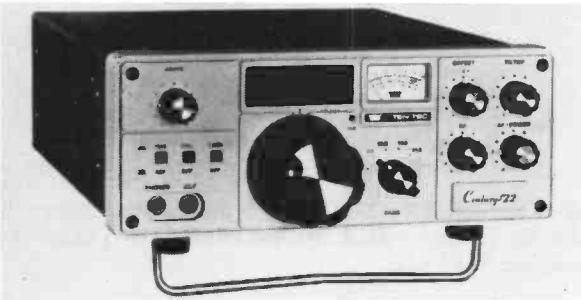
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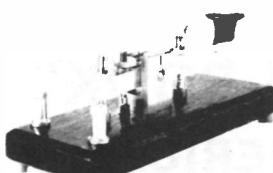
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