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SHORT WAVE MAGAZINE

(GB3SWM)

ISSN: 0037-4261

VOL. 44

MARCH, 1986

No. 509

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

Annual Subscription:

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

Editorial Address: Short Wave Magazine,
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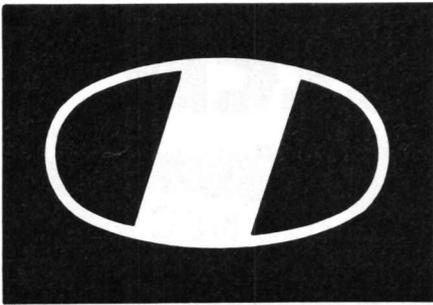
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The FIFTIETH YEAR of
“Short Wave Magazine”
starts with this issue!



WORLD-WIDE COMMUNICATION

VHF BANDS

NORMAN FITCH, G3FPK

DURING the first week of February, after a long period of quiescence, the sun became much more active. Results of this were the complete disruption of some HF bands and a series of big *Auroral* events enhancing VHF/UHF propagation, this latter to the delight of readers of this feature. As this is started, the exact history of the event which caused this upheaval was unavailable, but any more information may be included later.

Award News

Another overseas reader has joined the 144 MHz QTH Squares Century Club, membership certificate number 63 being issued to Karl-Heinz Binder, DL3OAT, on February 10. Karl is ex-DG3AB and lives in the village of Algermissen, near the city of Hildesheim (EM60c). He was first licensed in 1979 and his present call was issued in January 1985. The station comprises a Yaesu FT-225 with a QQE06-40 PA and two 10-ele. *Parabeams*, stacked. The 100 cards were for all SSB mode. 86 on tropo., eight *via Es* and six *via Ar*, and were from 22 countries. Karl is also on 70cm. on which he runs 50w to a hybrid *Quad* group of antennas.

Gerald Nenner, DL8FBD, member no. 39 of the 144 MHz QTHCC, was issued with a sticker for 175 squares on Jan. 17 and now has 177 confirmed. The 24 new ones were 11 on SSB, 12 on CW and one on FM with EA5DUI (YY) *via Es*. Seven QSOs were on tropo., 12 on MS and five *via Es*. A nice *Es* contact was with UA6LJV (TH) on June 17, 1983 and Gerald now has 209 squares worked.

The Morse Experiment

The Class B Morse Experiment ends on March 31 and *RSGB* members should have noticed the questionnaire on page 3 of the supplement in the February issue of *RadCom*. First the positive points and several readers have stated they did benefit from it and that practising "live" on the VHF bands did help build up their confidence quicker than might otherwise have been the case. Those who did best were regularly helped by local Class A operators which amounted to free, personal tuition.

Second, the negative aspects as observed from your scribe's QTH and on 144 MHz. The *RSGB*'s recommendation that the "all-mode" section of the band was the appropriate place for Morse practice has certainly not been adhered to. There seem to be almost continuous occupancy of 144.15 and 144.25 MHz at times, while other nets appear on a more random basis in the 144.15 to 144.50 MHz SSB segment. Unfortunately, many of these CW signals are far too click-ridden, mainly due to basic design faults in the equipment.

A few weeks ago, two operators were heard at S9 plus on FM in the exclusive CW section using F2B modulation thus radiating numerous carriers when they transmitted Morse code. Their feeble excuse was they just could not find any "channel" above 144.50 MHz that either was not in use or was designated for some specialist mode. Some Class B operators have been operating in the exclusive CW section of the band without voice identification as required by the letter of variation. In a recent contest, one G6 was apparently competing and calling a French CW station.

If this experiment is to be continued after March 31 — and one suggestion is that the facility be incorporated into the Class B licence — it would be preferable if it were *legally* restricted to 144.50 to 144.845 and 145.00 to 145.79 MHz, thus avoiding the "DX", beacon and satellite sub-bands; this would benefit all operators. Perhaps Class A licensees might care to comment.

The Satellites

About 300 *AMSAT-UK* members replied to a questionnaire seeking views on future amateur satellite developments. The results were summarised in written form in *Oscar News* No. 56 and it seems that the majority want simple-to-use, Mode B type transponders in orbits which would give opportunities for long range communication, for long time periods. One satellite that does currently fit this bill is *Oscar 10* yet once again, no reports have been received from any user.

In an attempt to foster some reporting on what it being worked by those who do use *O-10*, your scribe has volunteered to edit a "who is working what" feature in *O.N.* In the early days of the *O-6* and subsequent "birds", all-time countries worked tables using a points system were published, but fizzled out for some reason.

There appears to be three categories of satellite user. First is the type who operates exclusively on them and almost invariably never lets on to others what he or she is doing. Second is the dedicated scientific type, only interested in highly technical aspects of the *UoSAT* programs, like digital communications experiments, imaging, particle wave data, etc. Third is the largest group which would like to use

satellites for communication purposes by traditional modes but who think it beyond their capability to understand how to do it.

For this latter group, much has been published in this *Magazine* and elsewhere to assist the radio amateur of average intelligence to operate through orbiting satellites. It is also one of *AMSAT-UK*'s main functions to educate this group in the how, when and where matters. *AMSAT-UK* has over 2,000 members and publishes a 36 page journal six times a year; it has an extensive supplies service of hardware and software and all inquiries should go to the Secretary, *AMSAT-UK*, 94 Herongate Road, London E12 5EQ, with an *s.a.e.* or *IRC* for overseas readers.

The *NASA Shuttle Columbia* launched on Jan. 12 at 1155 UTC carried a so-called "Get-away Special" package devised by the *Marshall Amateur Radio Club* in the U.S.A. *UoSAT* Bulletin No. 162 for Jan. 24 included a preliminary report of reception of synthesised voice telemetry by

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

April issue—March 5th
May issue—April 2nd
June issue—May 7th

Please be sure to note these dates.

PY2BJO in Saõ Paulo, Brazil. On Jan. 13 *MARCE* telemetry was successfully relayed through *O-10* and received by VK5AGR and ZL1AOX. Later direct *MARCE* telemetry was received by JH1RNZ, ZS6AKV, 5Z4EG, WH6AMX and WA5NOM. It seems doubtful is any of this would have been in range of the U.K.

Contest News

Winner of the 70 MHz Fixed Contest held on Oct. 27, 1985 was G4ANT with 530 points. Runner-up was G4ZAP with 498 and G4RFR was third with 482. The 144/432 MHz Contest is on March 1/2, a 24 hours event starting at 1400. For transmitting types, this is a two section affair for either Single-op. or Multi-op. stations. While anyone can participate, entries will not be accepted from those only operating on 144 MHz. A point worth mentioning is that in *RSGB* contests, Rule 5 requires that, "All operators must be *RSGB* members". Presumably that means that, if a Multi-op. station has a non-member in the team of operators, their entry will not be accepted.

The last two legs of the 70 MHz *Cumulatives* are on March 9 and 23, from 1000 to 1200 GMT. The best three periods count for the final score and entries go to

G4FRE who is *QTHR*. There are two events on April 6. First the 432 MHz CW Contest from 1300-1700 which is a one class affair. Then there is the *Barking Radio and Electronics Society's* Contest taking place at the same times on 144 MHz. Its two sections are for full legal power and for low power defined as "20w PEP output or equivalent on other modes". Exchanges to be the usual RS(T) and serial number plus *administrative* counties, even though the metropolitan counties will no longer exist. Scoring is one point *per* contact, but 10 if you work G3XBF and G8XBF. Countries outside the U.K. count as counties and the multiplier is the total of different U.K. counties plus overseas countries. Entries go to Mr. M. G. Toms, 32 Wellington Road, Rayleigh, Essex, SS6 8EZ, postmarked no later than April 21.

Six Metres

It seems that quite a few operators were ready for the starting gate to go up at 0001 GMT on Feb. 1. John Nelson, G4FRX, operated GB3RS from *RSGB* Headquarters and by 0045 had worked all the stations that could be heard. The noise level seems rather high and it does not appear to be a very good VHF site. Even at midnight, there is QRM from factories on the estate and the noise from the Society's computer contributes to a raising of the noise floor. John reckons that GB3RS's best DX was G4OAE in Reading which illustrates the poor QTH suggestion. When finance permits, it is hoped to put the antenna on a higher mast which could improve matters.

Rod Burman, G4RSN, called "CQ" at 0001 and, "... was surprised to hear an absolute pile-up calling". 22 stations were worked on the first day. Best DX up to Feb. 3 were Cambridge and Hastings from Sunningdale (BRK). Rod reports the commercial to home-made equipment ratio as about 2:1 with some of the nicest signals emanating from the home brewed variety. Jerry Russell, G4SEU, (WKS) telephoned the office to report 16 counties worked.

John Jennings, G4VOZ, (LEC) uses a *Yaesu* FT-726R and 3-ele. *Yagi* at 15ft. a.g.l. and reports large nets assembling when the band became available. In flat conditions, he worked 46 stations in the first two days including G4TKO (YSS), G3UOF (NOR) and G4IFX (CHS). Initial tests on 4m. and 6m. revealed a 3 dB advantage in favour of 4m. but with slightly higher noise floor levels.

Nigel Wilson, G4VVZ, (NOT) also reported high activity at first but did not hear GB3RS. Sharing activity with his father, G4NZU, 15 stations were contacted including G3ZYC (DYS) running 10w to a G5RV antenna, and G3XPU (LEC) with 600mw. Later on on Feb. 1 a trip was made to the *Derbyshire Hills Contest Group's* station G4ZAP in

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	—	—	65	7	28	5	9	3	117
G3FPK	—	—	61	14	—	—	—	—	75
G4WXX	—	—	63	8	—	—	—	—	71
G6HKM	—	—	36	7	10	2	—	—	55
G4YCD	—	—	35	3	9	2	—	—	49
G6XRR	—	—	41	5	—	—	—	—	46
G4SEU	24	2	9	2	6	1	—	—	44
G4YIR	—	—	25	5	—	—	—	—	30
GW6VZW	—	—	24	4	—	—	—	—	28
G4MUT	9	1	10	2	3	2	2	1	27
G6OKU	—	—	18	1	4	1	—	—	24
G4TGK	—	—	19	3	—	—	—	—	22
G2DHV	2	1	9	1	—	—	—	—	13

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

gale force winds, rain, sleet and snow, in sub-zero temperatures and no mains electricity. Even so, the station was put on the air and nine stations were contacted, best DX being G3RSI (SRY). On the 2nd, from home, G4FZH, G4SEU and G3OUT were new stations worked and GM4NFC was heard. The equipment at G4VVZ/G4NZU is a *Trio* TS-830S, *muTek* transverter at 10w to a dipole.

Ken Ellis, G5KW, (KNT) reported lots of activity in poor conditions. He estimated that the new, low power limits resulted in the signals from the original permit holders being some 30 dB down. Ken was QRV in the huge Aurora on Feb. 8 which came in two distinct phases. Between 1301 and 1825, the reflecting curtain was to the northeast when G, GI and GM, and GWs were heard/worked. Between 2140 and 0115 on the 9th, it was all happening to the northwest. He had QSOs with GJ3YHU, GM3ZBE, PA0XMA, GW4VVX, LA9DL at 2358. From 0020-0050, GM3DOD was heard calling "CQ" likewise LA9DL at 0030, but with no takers. At 0105, Ken heard GM3DOD and GJ3YHU in QSO. An interesting observation is that G5KW's QTH is in a basin from which tropo. and extended ground wave coverage is poor. However, in the *Ar*, he did consistently better than the more favourably sited stations.

Up to Feb. 4, G5KW reports that G4IJE (ESX) had made 40 QSOs with new operators in 17 counties and G3YCN (KNT) 30 with 10 counties. G3OSS (LDN) had made nearly 100 QSOs but including some original permit holders. Alex Scott, GM8BDX, (BDS) reports two or three stations QRV in both Aberdeen and Dundee and four or five in the Borders Region.

Eamonn Gilmartin, EI8EF, (Donegal) sent a copy of a letter from the *Minister of State, Department of Communications'* office in Dublin, dated Jan. 2 which stated that the Irish Government was prepared to issue 50 MHz permits to, "... a small number of qualified Experimenters ...".

Subsequently, EI2W and EI9D received their permits and a total of 20 will be issued for operation between 50.00 and 51.75 MHz outside peak TV hours. Likewise, CT1WW (WB) has been granted a 50 MHz licence for use outside TV hours. At present, it is reported that Tiago is running 3w of SSB and 2w of CW.

Four Metres

Only one report this month from G4VOZ who was using the GB4MTR call from South Leicestershire from Jan. 1 through 28. John operated on 27 days for an average of three hours and made 140 QSOs with two "got aways". 24 counties and two countries were worked. 15 FM, 22 CW and 103 SSB contacts were made, best DX being G4PCB (DVN), G3VIP (HBS), G3UVR (MSY) and GW3MHW (DFD). Band newcomers were G4TGB in Mansfield and G4UVA in Dereham and others not previously worked, all G4s, were KLT, JNY, LJR, PCB and 4RXD/P. Ten Class B and two Class A operators made cross-band QSOs with GB4MTR from 70cms., best DX being G8SSL in Nottingham. The call sign was handed over to Peter Asquith, G4ENA, (GLR) at midnight on Jan. 28.

Two Metres

As the "Great Aurora" occurred after the deadline, it will be covered separately. A warm welcome to Mike Honeywell, G0ABB, from Warsash, (HPH) who is enjoying the CW end of 2m. and enters the Annual Ladder with 37. His station comprises a *Trio* TR-9130 with *Mirage* B3016 amplifier running from 12v batteries until a PSU arrives. The antennas are a 17-ele. *Tonna Yagi* and a vertical isopole. Mick Allmark, G1EFZ, (YSW) has written to update his squares totals but confesses that interest in the Annual Table has waned somewhat. He has accumulated 30 countries on the band, all time.

Bob Nixon, G1KDF, (LNH) has got off to a flying start and that before the big *Ar*. But he did operate in three earlier January

events, one on Jan. 6 from 2035 to 2115 brought GM8PNP (SLD), GM6WQC (HLD) and GM1LAV (WIL) in WS square; all were very strong. In a ten minute *Ar* on the 9th at 2010 he again worked GM1LAV. The best event was on the 21st, 1800-1945 when Bob made contact with GM6LXN (YS), GM6TKS (WIL), GM0BPY (ZP) and GM6LNM (XP). Other GMs, a GI and a PA were heard, along with OZ1CFO (ER) who was heard working to OH. At 2335, it returned and GM6TKS was worked again. A short tropo. opening at 1430 on the 18th brought GM6LXN.

J. Challenger, G4EIB, from Dudley, (WMD) is another keen CW operator and a new contributor. He uses a *Trio* TR-9130 with 30w to a 14-ele. *MET Yagi* at 35ft., the QTH being 750ft. *a.s.l.* He is always glad to help newcomers to CW, "... with a bit of slow stuff, if necessary". Graham Jarrett, G4PPV, from Rochester, (KNT) is another new contributor and has been attracted by the Annual CW Ladder idea; he enters with 35 stations.

Welcome to John Wimble, G4TGK, from New Romney, (KNT) whose main interest is Worked All Britain. He has been aiming for the Winter Award which finished on Feb. 28. His squares/countries tally is 90/26, all time. K. Lewis, G4TJE, from Bromley, (KNT) also writes for the first time and enters the CW Ladder. He runs an *Icom* IC-202S at 3w to a *Slim Jim* antenna but plans to increase the power and beef up the antenna when funds permit.

Jack Charnock, G4WXX, caught the *Ar* on Jan. 6 working GM3JII and GM8PNP, but missed out on the other events. Martin Lowe, G4YCD, (AVN) is another WAB enthusiast and reckons that is what keeps him going when the band conditions are poor. He has noticed that, over the last three years, the first four months have been rather quiet, so he is looking forward to May and the summer.

June Charles, G4YIR, (ESX) says her best DX were DL square on Jan. 5, and XL on the 17th, both on SSB. Her station consists of an *Icom* IC-260E, *Mirage* B108 amplifier at 80w and an 8-ele. *Yagi* 8m. *a.g.l.*, the QTH being 35m. *a.s.l.* June already has 46 CW stations in the 1986 log. Ela Martyr, G6HKM, (ESX) was doing well till Jan. 12, "... then disaster struck; a croaky voice and a virus followed by pneumonia ...". Her outdoor shack has been ruled out of bounds so only local FM QSOs from a small transceiver indoors have been possible.

Mike Higgins, G6XRK, mis-read the deadline for this issue in the January VHF but managed to make it anyway. He has been trying for the Border Award but asks, "Where is the activity?" Up to Feb. 3, he had only worked five stations in Shropshire and one each in Clwyd and Hereford.

Erik Gedvilas, G8XVJ, (CHS) is quite

QTH LOCATOR SQUARES TABLE

Station	23cm.	70cm.	2m.	Total
G8TFI	79	141	126	346
G8GXP	9	133	290	432
G4FRE	56	124	78	258
G3XDY	70	123	169	362
G3JXN	77	119	172	368
G14ICD	59	117	239	415
G3IMV	—	108	383	491
G3UVR	61	106	213	380
G3PBV	41	106	200	347
G4MAW	45	106	52	203
G4TIF	—	104	173	277
G8KBO	34	99	214	347
G3COJ	42	97	170	309
G8HHI	23	96	135	254
G6DER	53	95	164	312
GW4LXO	45	91	230	366
G8PNN	53	91	126	270
G8ULU	36	91	127	254
G4NQC	61	90	211	362
GW4TTU	37	87	227	351
G6HKM	—	87	133	220
G4RGK	27	86	197	310
G8XVJ	—	86	211	297
G1EZF	32	85	182	299
G4MUT	16	85	130	231
G6MGL	45	83	133	261
G4MCU	25	82	201	308
G6DZH	—	78	128	206
G1LSB	1	72	70	143
G4DCV	24	71	247	342
GW8UCQ	1	70	120	191
G8WPL	16	70	105	191
G4HFO	—	70	120	190
G4BWG	—	68	160	228
G4FRX	—	66	99	165
G1KDF	4	64	108	176
G4NBS	25	63	53	141
G4JZF/P	—	63	—	63
G4TJX	—	60	100	160
G6YLO	20	59	67	146
G6HKS	—	58	180	238
G6YIN	—	58	87	145
G4ZTR	35	57	82	174
G6CAM	18	53	144	215
G6JNS	5	53	119	177
G4CQM	—	52	87	139
G6XSU	—	52	43	95
GM0BPY	—	50	110	160
GW8VHI	—	48	94	142
G4NRG	5	47	132	184
G4OAE	—	46	195	241
GW3CBY	18	46	107	171
G4VPM	—	46	117	163
G8MKD	—	45	112	157
G8ROU	1	43	88	132
G1IHK	—	42	42	84
G6XVV	5	40	172	217
G6CSY	16	39	34	89
G3BW	15	38	269	322
G4KUX	—	36	296	332
G6AJE	—	36	85	121
G4RSN	2	34	90	126
G6XLL	—	33	95	128
GN8BDX	13	31	41	85
G8VR	2	24	251	277
G1JTFMM	—	22	122	144
G4MJC	—	18	160	178
G4ERG	—	16	278	294
G8RWG	—	12	103	115
G4WHZ	—	8	49	57
G8UDV	—	2	42	44
G2DHY	—	1	34	35
G6SIS	—	1	31	32
G3POI	—	—	448	448
G4LJE	—	—	338	338
9H1CG	—	—	276	276
G4DHF	—	—	272	272
GM4IPK	—	—	245	245
G4DEZ	—	—	242	242
G3FPK	—	—	212	212
G4SFY	—	—	198	198
G6ECM	—	—	194	194
G8LFB	—	—	189	189
G4MEJ	—	—	187	187
G4IGO	—	—	181	181
G8TGM	—	—	181	181
G4YUZ	—	—	168	168
G4DOL	—	—	148	148
G4XEK	—	—	143	143
G0CAS	—	—	115	115
G1ECC	—	—	107	107
G6XRK	—	—	97	97
G4TGC	—	—	90	90
G8XTJ	—	—	90	90
G1IJO	—	—	82	82
GW6OFI	1	—	75	76
G1DWQ	—	—	72	72
G0BPS	—	—	50	50
G1JOU	—	—	44	44
GW6VZW	—	—	44	44
GM4WLL	—	—	39	39
G4WJR	—	—	37	37
G1HGD	—	—	31	31

Starting date January 1, 1975. No satellite or repeater QSOs.
 Band of the month 70cm.

active on MS but thought the December *Geminids* "... a wash-out". The shower peaked when he was in bed but he did complete on the 144.200 MHz random SSB QRG with OZ2KZR and 14YNO. Skeds with SM2CEW (LZ) and TK5EP on Dec. 14 came off, too. In the *Quadrantids*, he completed with LA2AB (FT), EA3AQZ, OK2KZR, SM4KYN, YU1MWP and DL2MBG on random. Skeds with IW4ATB and I3LDP were completed but "Rogers" were missing from SM2CKR. Erik is a member of the *Warrington Contest Group*, whose call on 2m. is G4CDA.

John Eden, GM6LXN, (HLD) covers the *Ar* events of Jan. 6, 17 and 21, the first of which was from 2030-2115. He worked GW6DBB (Only DDB in *Call Book* OM), GM6OFO, G4SXU (YSN), OZ1JZY, G6XVV (YSS) and GW4TEE (CWD). The G4 was a CW QSO. The only QSO on the 17th was at 1930 with SM1LPU who has an antenna array of eight 15-ele. *Yagis*. The 21st brought the best DX between 1720 and 1930 when 24 QSOs were made, mostly outside the U.K. These included SM6JMZ, OZ1IPU, SM7OSW, LA1ZE, SK7OA (GP48b), OH5LK on CW, SM1LPU, SM3JGG, SM0KFJ, SM4XL, SM6PED, LA3EDA, SM1PDA, and Y23SB on CW. In a brief second phase at 2300 John worked GM4NHI, and LA7KK on CW. On the 18th, there was a short tropo. opening at 1435 in which G1KDF and G4WXX were contacted.

Paul Baker, GW6VZW, (GWT) has found very deep QSB to be a great problem in tropo. contacts. His January successes include F1GXB (XI), GU6EFB, G6XRK (ESX), G1CWP and G4ZTQ (SXW), G4XBN (NHM) and G6HIE (SXE). 1986 hopes are to work GI for the first time and to work more EI and GM stations. Paul is still looking for his first QSO with a Cambridge station. Jim Rabbitts, G8LFB, (LDN) found the *Ar* on Jan. 21 and at 1654 worked GM6TKS (WS) and then GM6LXN (YS). G8XVJ was also contacted.

The *Ar* on Jan. 21 came to your scribe's notice thanks to G8LFB and went on till 2030. The most consistent signal was GM4YPZ (YQ19g). Several times it seemed as if the event had finished, but he was always audible to prove otherwise. Best DX heard was SM0HAX (JT) on CW at 1834, QTE 355°. The other G, GM and LA stations were best at 10-20°. Activity from the central and southern parts of G was very low with few, if any, of the "regulars" to be heard. There were several local tropo. QSOs going on. When SM0HAX was being called, some clown kept sending "QRZ?" without giving their call and in very poor Morse, too. QRZ? means, "Who is calling me?" In this case, the appropriate response was, "Nobody".

Seventy Centimetres

GIEZF has 300w available on the band and Mick finds it certainly makes a difference. The only "got-aways" in the October lift were OH, OH0 and SP and he seems to have worked everything else to bring his squares tally to 85. G4VOZ used the GB4MTR call on 70cm. making 96 contacts, all but two on SSB. John worked 17 counties from Leicestershire, best DX being G4VIX (ESX).

G4YCD's antenna system has been taking a battering in the January gales and the direction they pointed in was largely determined by the wind, it seems. Martin says the only really good QSO was with G1DOX (CBA) who he believes is now QRV on 2m. and 23cm. too. This contact provided an all-time new county and square, YO; Before being confined to the house, G6HKM had managed to work 10 counties and across the North Sea to PA. Ela's own county of Essex was the only near one listed, all the rest being at quite good DX.

The Microwaves

These bands hardly got a mention this time. G1EZF now has 32 squares worked but was only running two watts during the October lift so Mick could not raise the EA, OE, OK, OZ and SM stations, but did manage the nearer Europeans. G8XVJ is now on 23cm. as well with 10w of SSB to a single 23-ele. *Tonna Yagi*. The gear is part of the *Warrington Contest Group's* arsenal and Erik says their club call on the band is G3CKR.

The Aurora

Since this was started, a mass of data has been issued concerning the *Auroras* which started on Feb. 7 as observed from G3FPK. The first inkling that the sun was becoming active was on the 5th, when the sun noise was very high all day. In fact, some listeners noticed it on the 4th. At sunset on the 5th, your scribe measured sun noise at 9-11 dB above the usual background level. It was so loud that it completely obliterated GB3CTC on 144.915 MHz and which is in the same direction as the setting sun.

Before midday on the 6th, Charlie Newton, G2FKZ, telephoned to report that the A index was 60 and, "... going up like a rocket". He was absolutely certain there would be a major *Aurora* by the 7th or 8th; he was not wrong. The information from Meudon in France was

that an M5 flare commenced at 0947 on the 7th, reaching a maximum at 1034 and ending at 1126. A major *Magstorm* occurred on the 8th due to a huge flare which reached 3,200 flux units; a *geolert* was issued at 1300. At 0245 on the 8th, a *proton* event was recorded at 130 particles *per square centimetre per second, per steradian*, this event ending at 2010. Polar cap absorption was recorded from 2200 on 7th, reaching a maximum of 1.1 dB at 0600 the next morning. A "very marked" *Magstorm* commenced at 1748 on the 9th. The foregoing information was hurriedly scribbled down during an eleventh hour telephone call as it was being extracted from reams of output from the Telex machine.

Obviously, all this happened well past written copy deadline so the following reports have been compiled from telephone calls and subsequent "inquests" with participants *via* the amateur bands. At G3FPK, the first *Ar* signal heard was GM0BPY on CW at 1442 on the 7th at RS42A; nothing else was copied, maybe due simply to lack of activity on a Friday afternoon. At 1605, an absolutely unreadable SSB signal was heard on 144.36 MHz at RS15A, after which it all began to happen. At 1620, GM0BQM/P (YP62g) was heard on SSB at RS35A, and OZ1FGP (JO46RF) on CW five minutes later. This event peaked between 1650 and 1700 approximately. Stations contacted on CW included GM3JFG (XR), SM5IDM (HT) and SMIMKY (JR) all at

QTE 20°, the SM5 beaming at 300°. G3FPK closed at 1715 for the night.

The 8th was *the* day, the first *Ar* signal being heard at 1240 with a continual event which was still in full swing at switch off at 0115 the next morning. The first QSO was with GM3JIJ (WS) at 1245 at 0° after which all the GMs were loudest at about 20-25°. The ON, PA and DL stations came in best at about 50°. The first Russian station worked was UQ2GMD (LR) at 1430 at 15°. Some EI stations were worked at 20° and after working ON4PS (CK) at 40° at 1524, the beam was rotated through north, where the signal disappeared, further to the west. A strong *Ar* reflection from the ON was copied between 300 and 270° and it certainly was not from any minor lobe off the back-side of the 16-ele. *Yagi*.

The station was switched off for dinner at 1740. Weak SSB *Ar* was heard later at 1850. A QSO was being monitored at 2042 between GM4UFD (ZR) and G3ZIG (NOR) during which the GM completely vanished, as did all other signals. From 2052 to 2105, G3IMV, G4MEJ, G4PCS and G3FPK were holding an inquest but soon there was QRM from an *Aurora*/SSB station. So it was back to CW and LA8SJ (FT) was worked at 2122 at 350°. Between 2300 and 0030, the QTEs seemed to vary between 350° and 20° for LA, SM5 and UQ2 stations. EI stations were best at 35° from about midnight to close down at 0115.



"Two of your QRP friends to see you, dear . . ."

THIRTEEN CENTIMETRES ALL-TIME TABLE

Station	Counties	Countries	Squares	Total
G8TFI	26	7	32	65
G3JXN	23	8	31	62
G8PNN	15	6	23	44
G3XDY	12	6	17	35
G6DER	12	7	15	34
G6YLO	6	1	3	10

John Hunter, G3IMV, (BKS) stuck to CW as usual and winkled out some fine DX. This included UP stations in LP, MO and MP, SPs in KM, JO, etc., and two HGs for whom he has to beam at 85°. David Johnson, G4DHF, (LCN) found SP7ADL in KL square at 0120 on the 9th, QTE 45° and also contacted SP4 and SP9 districts. Alan McMillan, G4SSO, (LDN) worked lots of GMs and DLs, Els, in VL, VM and WM, GW1JOS in Anglesey, GM1DSK (YQ), GM3JIJ who gave him an RS39A report due to QRM, and GM1LUZ (YP).

John Regnault, G4SWX, (SFK) has a four *Yagi* array and adequate power. He stuck to CW, using an ordinary hand key, and made about 150 QSOs in all. He found QTEs anywhere between 300° through north to 90°. By beaming to the east around midnight on the 8th, he worked seven YUs, OK, YO and UB5BAE (MJ). For YU3ES he aimed at 80° and the YU was looking at 340° which would suggest that one of the reflecting curtains was over the western Baltic.

Andy Stafford, G4VPM, (DVN) uses a *Yaesu* FT-102, FTV-107R transverter and 70w to an 11-ele. *Yagi*. On CW in the afternoon of the 8th, he worked GM4DGT (YQ), G3BRA (ZP), G4OEU (ZO), GM3JOB (XP), EI4FO (WM), EI9BG (VM), SM7MKT (GP), GM4DJS (YP) and GM4UFD. Evening CW brought SM1MUT (JR), OZ1DOQ (GP), then RQ2GAG (MQ) at 1,936 kms., GI4RWX (XO), GM3WTA and GM4ILS (YR).

Just as this was being compiled, a late letter from Philip Murphy, GI4OMK, from Belfast arrived including five pages copied from his log and a squares map showing the 52 squares worked from the M line in the west to the J line in the east, and from the G row in the south to the U row in the north. 16 countries were worked including LA, OE, OK, SM, SP and Y. The event started at 1417 on the 8th ending at 0247 on the 9th. Philip logged 93 QSOs on SSB and 13 on CW, but did not mention the important QTEs for future analysis.

Going through his log, the highlights were:— 1448 OK1MS (HK), 1527 SP3MFI (JL), 1531 OE5FPL (GI), 1540 Y23KO (GM), 1601 OE5OLL (GI), 0100 SM1LPU (JR), 0102 DB3RT (GI), 0140 OZ2KZR (LJ) and at 0148 OK1KT (HK), all on SSB. The best on CW were at 2318 SM51OT (JT), SM1MUT at 2334 and SM6CYZ (GQ) at 2357. Philip uses an *Icom* IC-251E with *muTek* board and 400w through *Helix* FHJ2-50 cable to a 16-ele. *Tonna Yagi* at 40ft. He makes a plea for G stations *not* to call when he and other GIs are specifically calling for European DX. This is a universal problem on all bands, though. The bigger stations in south and east England are invariably called by hordes of "local" Europeans

Station	ANNUAL CW LADDER				Points
	4m.	2m.	70cm	μ Wave	
G4YIR	—	46	—	—	46
G0ABB	—	37	—	—	37
G4PPV	—	35	—	—	35
G3FPK	—	32	—	—	32
G4EIB	—	20	—	—	20
G4TJE	—	20	—	—	20
G0DJA	—	20	—	—	20
G2DHF	1	14	—	—	15

No. of different stations worked since Jan. 1.

when they call, "CQ OH/U . . ." for example.

John Nelson, G4FRX, relayed some information from GM6TKS in the Western Isles. He worked 23 countries and, this is most interesting, he contacted OY9JD in the Faroe Islands by beaming southwest so it will be fascinating to find out where OY9JD was beaming. Your scribe would guess about 210° as this would tie in with the *Aurora* reception of ON4PS at about 285° previously mentioned. This would suggest a reflecting region over SM square to the west of Ireland.

This was such a widespread event that it seemed wherever one beamed, QSOs could be made with discrete areas. Doubtless as all the reports from around Europe come in, G2FKZ will be able to compile a more complete picture of this spectacular radio event. Not surprisingly, a visual *Aurora* was seen by many observers at much more southerly latitudes than normal. G4SWX saw it through breaks in the clouds and it extended from the north to the northeast. *BBC Radio* reported its being seen in Essex. There was a different picture from GM6TKS though. He reported nothing to the east but it was well visible from the north, through west to the southwest. This event would have been a spectacular one to

have seen from space and it will be interesting to learn what happened in North America.

Naturally, detailed reports for next month are eagerly awaited, particularly with information on your and the other person's beam headings. If you so request, all such reports will be passed to G2FKZ. Perhaps Charlie will have a good idea of the scope of this major event in time for the VHF Convention.

VHF Convention

A final reminder that the *RSGB's* National VHF Convention is scheduled for Sunday, March 16 at the Sandown Park Racecourse at Esher in Surrey. For full details see last month's *VHFB*, page 517. The doors open officially at 1030 and tickets can be bought either in advance from *RSGB* HQ or at the door. £1.00 is the cost but under-18s get in for 50p. If you put on short trousers and a school cap and say you are under 14 you get in free. The venue is on the north side of the A307 Portsmouth road, between the well-known Scilly Isles roundabout and the town of Esher. Acres of free parking through three entrances and your scribe looks forward to meeting readers again.

Sign Off

That's it for this month. The deadlines for forthcoming issues are in the box, so please make sure you note them correctly in your diaries. A reminder that British Summer Time is scheduled to start at 0200 GMT on March 16 — VHF Convention Day — so don't forget to put your clocks on. Send all your letters, claims and comments to:— "VHF Bands," *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts. AL6 9EQ. 73 *de* G3FPK.

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The "TX80" 80-Metre CW Transmitter, Part 1

Building the VFO and Transmit Boards

REV. G. C. DOBBS, G3RJV

ONE of the problems of being an occasional writer for radio magazines is that after a while one begins to wonder if construction is being done for simple pleasure or to please a possible public. That is the reason why, for the most part, I do not like building projects on request. I like to think that the articles I write describe things I would have built anyway, irrespective of publication. Recently I have had a few requests to produce an 80-metre QRP transmitter for publication, but I did not need one so why build one? — even though the request is sensible enough. During recent months 80 metres has become a very lively band and a lot of that life has been low powered operation centred around 3560 kHz, the international QRP calling frequency.

But radio moves in mysterious ways and not so long ago I was fortunate enough to acquire a Drake 2B receiver. I had been looking for one for some time and its arrival did nothing to diminish my support for its acclaim as one of the best CW receivers ever produced. Perhaps a biased view, but it would be very difficult to beat with much that is manufactured today. For several weeks I had some very enjoyable excursions on the 80-metre band with the 2B and a little crystal controlled transmitter which ran about a couple of watts of RF output. Real radio at its best! What I did not have was a neat little transmitter with a VFO to give me about 2 watts on the band so that I would be better able to join in some of the QRP activity as it dodged around the evening QRM. Necessity is the mother of . . . so this is the transmitter I built to enjoy some QRP operation on 80 metres alongside an existing receiver.

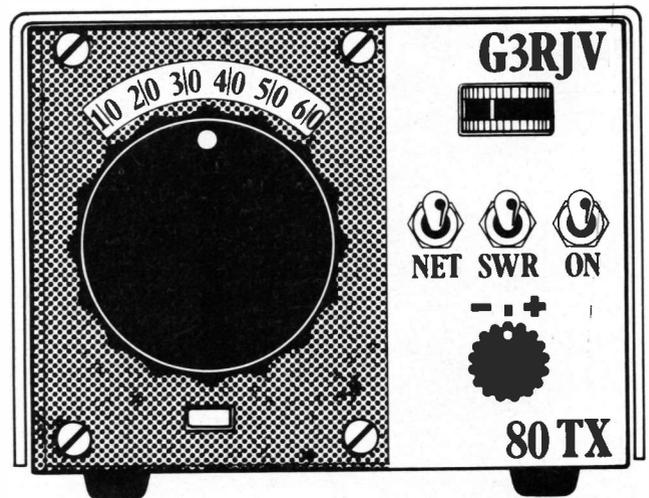
The TX80 is an 80-metre CW transmitter capable of some 2 watts or so of RF output across the whole CW sector of the band. The changeover between the transmitter and existing receiver are accomplished within the transmitter circuitry, which also contains a simple SWR meter to tuning up *via* an aerial tuning unit. In fact with the TX80 and a receiver capable of receiving CW on the 80-metre band, the amateur has a complete and viable station capable of making many useful QSOs. So if you have a decent CW receiver for Eighty (or the receive portion of a transceiver) the TX80 is a good way to join the enjoyable QRP activity on the band.

The description of the TX80 will be divided into sections which follow the pattern of construction: the VFO, the Transmitter Board, the Changeover Board, the SWR Circuit and finally the interconnection and switching circuits. If this pattern of construction is followed it is possible to test each section stage by stage as the building proceeds. The "build a bit and test" approach does save having to sort out a possible multiplication of problems in the complete project.

The VFO

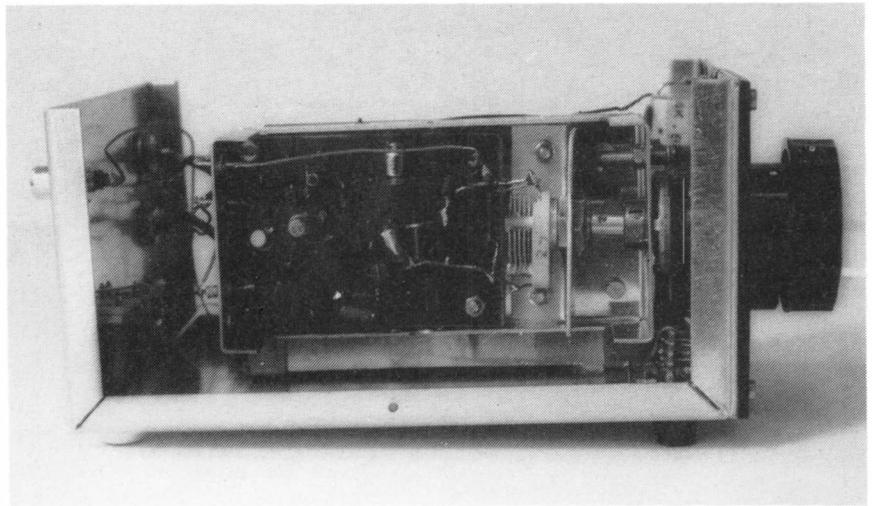
The circuit for the VFO is shown in Fig. 1. Know it? Well — most of us do! It follows the design that has become a standard in the amateur radio literature. From time to time, I have been asked

the origin of this particular VFO circuit. It has been described in Pat Hawker's "Amateur Radio Techniques" (RSGB) and in "Solid State Design for the Radio Amateur" (ARRL), the essential handbook for any radio constructor: the circuit is liberally splashed about the pages. The origin appears to be an IGFET VFO circuit by Hanchett, W2YM, in *QST* of December 1966; a diode is added to the gate input to provide a degree of automatic bias to aid stability. The oscillator is a Seiler form of Colpitts circuit with a parallel tuned circuit. The two-stage buffer amplifier has negative feedback to minimize the effects of changes in output on the frequency of the oscillator stage. Whatever the source and the merits of the circuit, it has become popular because it works. I have built the circuit many times and always been pleased with that useful combination of high output and frequency stability which it seems to offer.



The circuit of Fig. 1 should be no problem but even the best of VFO circuits can be rendered useless by careless construction. Good frequency stability depends upon good mechanical stability. The sayings about VFO construction are legion . . . "build it like a tank" . . . "like a brick outhouse" . . . etc. Seasoned VFO builders all agree on one point, namely sturdy and tidy construction is essential to frequency stability. The choice of capacitor type in the tuned circuits in the first stage, TR1, is important. Formerly silver mica capacitors have been advised for such sections of a circuit, often with an added negative temperature coefficient capacitor across the tuned circuit; these days most constructors swear by polystyrene capacitors in such

Side view of the TX80, showing VFO Board without its lid



and still go back to it; it also fits nicely into the inexpensive *Minffordd Engineering* Box A8. Using that box means that the coil L1 has to be mounted horizontally, but this need not be a problem. I have some nice little horizontal mounting brackets for 3/16" diameter formers which I culled from old equipment but these do not seem to be very easy to obtain. A mounting can be fabricated from stiff copper wire (say 20 s.w.g. tinned copper wire) by wrapping a turn around each end of the winding and tightly binding it by twisting the ends. These mounting posts can also form the termination points for soldering the ends of the winding; one side going to ground the other to C1/C2.

The printed circuit board is not the minimum etch technique that I use so often in RF circuits, there is plenty of bare board around the components although there is a good copper groundplane around the outsides of the board. This is to reduce any possible capacitance between the tracks on the circuit board. Some constructors eschew the use of printed circuit boards in VFO construction and prefer to use point-to-point wiring across tagstrips (G3VTT) or point-to-point over a plain copper clad board groundplane (W7ZOI). I have had good results building this circuit on Perfboard, the insulated board with a matrix of holes at 0.1 inch spacings, without copper tracks; I do not like the use of Veroboard in VFO construction unless all the unused tracks are removed. Both component layout (from the top) and copper track layout (from the bottom) are shown in Fig. 2. The coil, L1, is close wound on the former, which has an iron dust core. Some doubt the use of cores in VFO circuits, but if designed like this

circuit so that only a small portion of the core enters the coil at the correct frequency, the core appears to have no adverse effect and the setting up of the tuned circuit is much more simple.

The variable capacitor is mounted onto a stout bracket made from aluminium which allows the shaft to mate with a small epicyclic slow-motion drive. These drives are probably the cheapest option, with good torque and low backlash, that the average constructor can use; several companies sell them — but look for bargains. Avoid the cheapest friction drive reduction drives which have low torque and slip very easily. Make the bracket first to place the shaft in line with the centre of the front of the box. Turn the lid of the box upside-down and place it on the bench in front of the box. Hold the bracket firmly down onto the top; this is to raise the bracket to the height it will be inside the box. Turn the capacitor shaft so that it can scratch a mark with its side along the front of the box. This will give the correct height for drilling the hole for the slow-motion drive. I use small twist drills and bring them up to size with a reamer. The bracket should be mounted firmly into place and then the drive is pushed onto the shaft to find the correct positions to drill the holes on the front of the box for the drive. Unless quite a bit of care is taken in aligning the variable capacitor shaft and the slow-motion drive it will not rotate freely. A disc of stiff white card was added to the collar on the outside of the drive (it moves at the same rate as the capacitor shaft) to form a reading scale for frequency. This could be outside the final case of the transmitter, but I opted to place it inside with a small viewing window . . . it hides the scruffy disc!

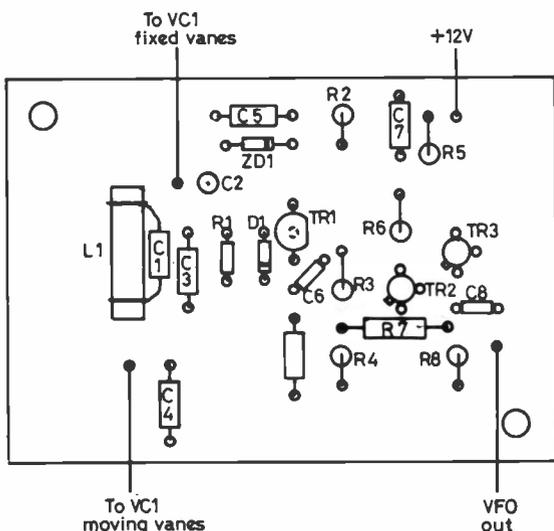


Fig. 2(a) COMPONENT LAYOUT - 80m VFO

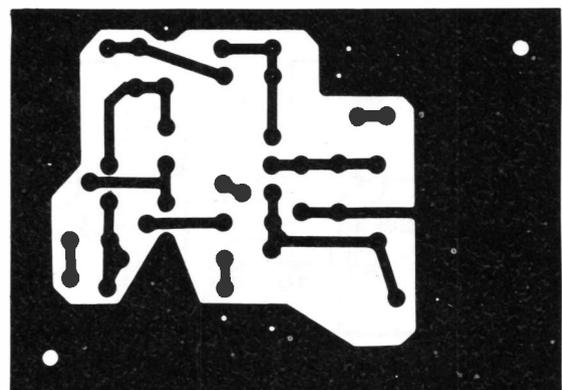
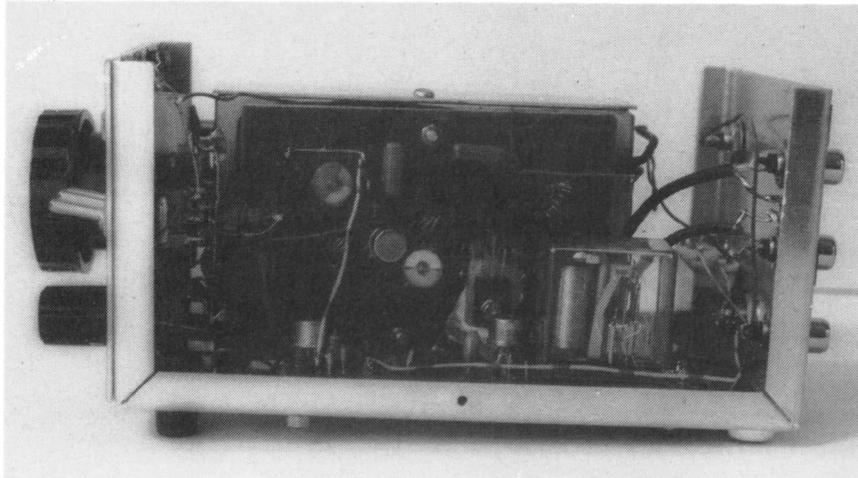


Fig.2(b) VFO TRACK SIDE

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Side view of TX80 showing top of Transmit Board and the side of the Changeover Board

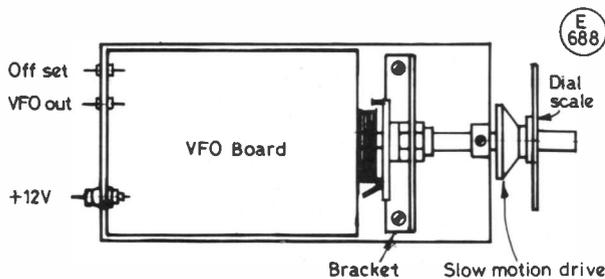


Fig. 3 VFO ASSEMBLY PRIOR TO MOUNTING IN MAIN CASE.

Once the VFO is completed it may be tested. If the constructor has access to a frequency counter, life is easy. The counter can be attached to the output and the power applied to check the output frequency. Failing this, it is not difficult to monitor the output with a receiver. The core of L1 requires adjustment until the frequency is 3.5 MHz with the vanes fully meshed. If using a receiver, tune it to 3.5 MHz and very slowly rotate the core until the VFO is heard on the receiver. If the receiver is half good there should be enough pickup with the top off the VFO to receive the signal. If not, then a foot or two of wire can be attached to the VFO output point to act as a radiator. The VFO frequency will change a little when the top of the box is added, so it requires to be set up in that condition. I drilled a small hole in the side of the case to give me access to the core. A more fiddly approach is to adjust, replace the case lid, note the frequency shift then open the box and

adjust again, replace the case lid, and note the frequency is correct with the lid in place.

The Transmitter Board

The circuit of the transmit board is shown in Fig. 4. This may be familiar to some *Short Wave Magazine* readers. Again I have turned to a well proven circuit. In fact this circuit was the one I used in the 10 MHz transceiver called "Ben" in *S.W.M.* for February and March, 1981. I have used this as the basis of this circuit, which originated with W7ZOI, in several transmitters, all

Table of Values Fig. 4

R1, R3, R7 = 220R	CT1, CT2 = 3-60pF semi-airspaced trimmer
R2, R6 = 1K	TR1 = 2N3904
R4, R5 = 100R	TR2 = BFY51
R8 = 47R	TR3 = BD131
R9 = 56R	RFC = 10 turns, 32 swg e.c.w. on a ferrite bead
R10 = 33R	L1, L2 = 40t, 28 swg e.c.w. on T50-2 core, link winding 4t 24 swg PVC covered wire over main winding
C1, C2, C4, C5, C7, C8 = 0.01 µF, ceramic	L3, L5 = 22t, 22 swg e.c.w. on T50-2 core
C3, C6 = 220pF, min. ceramic plate	L4 = 25t, 22 swg e.c.w. on T50-2
C9, C12 = 470 pF, poly. or silver mica	
C10, C11 = 1200pF	

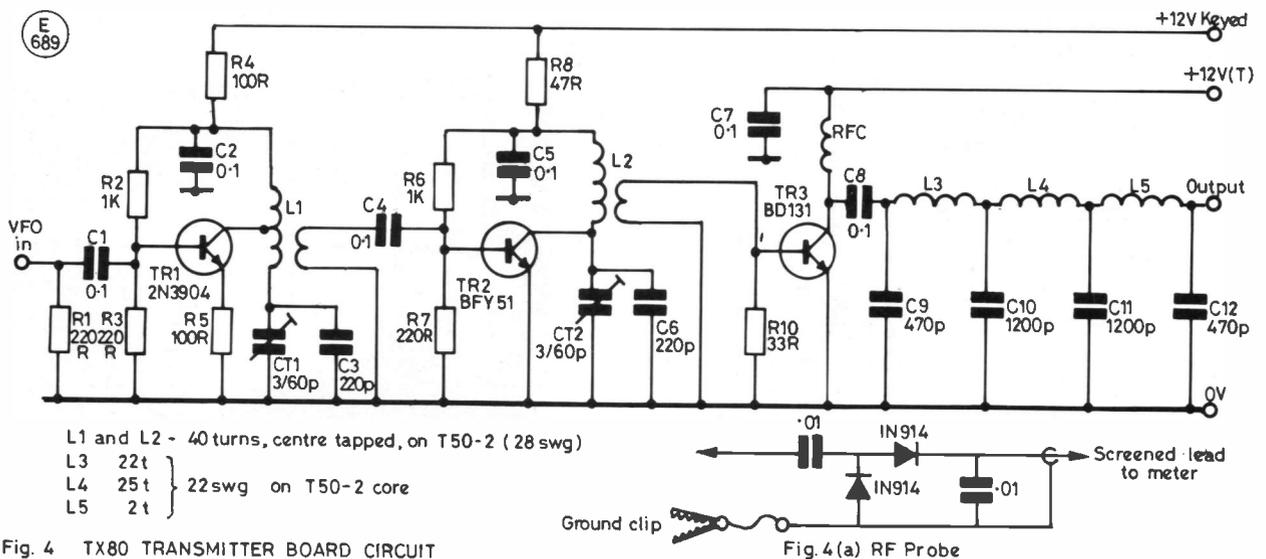


Fig. 4 TX80 TRANSMITTER BOARD CIRCUIT

Fig. 4(a) RF Probe

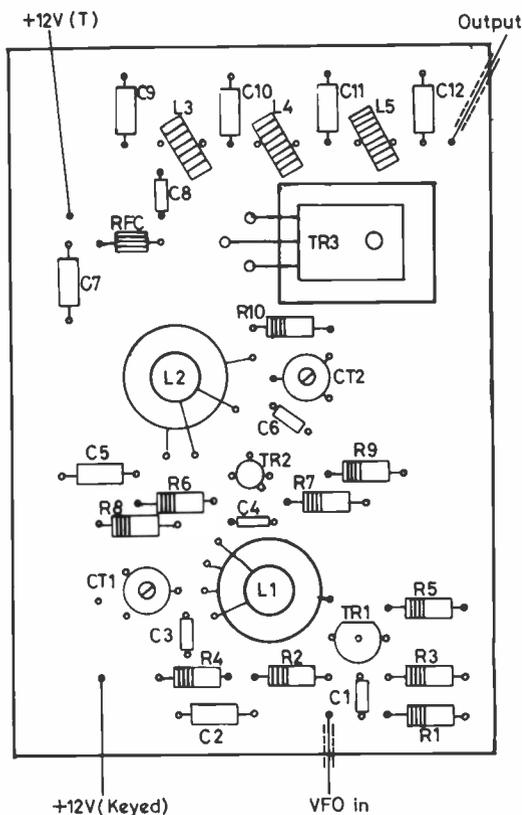


Fig. 5(a) TRANSMIT BOARD COMPONENT LAYOUT

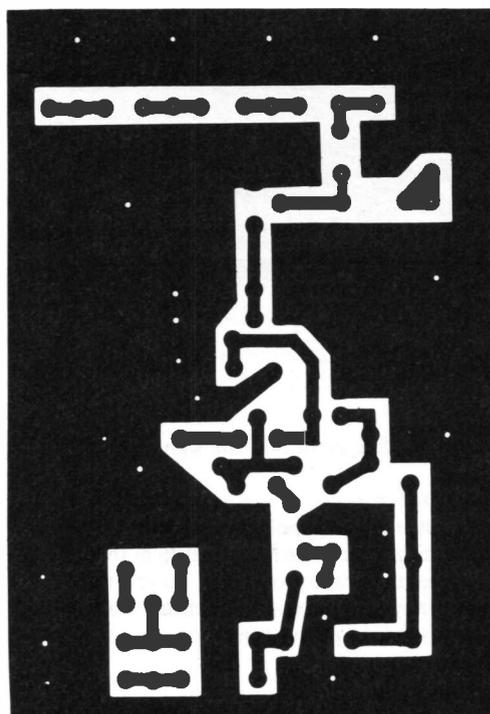


Fig. 5(b) TRACK SIDE

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with good results. The version shown here is capable of some 2 watts of RF output on 80 metres. This is a useful level of power for joining the QRP operators on the band, the usual power limitation for QRP operation being 3 watts RF output.

Shown alongside the transmitter circuit is the circuit, Fig. 4(a), for a little RF probe to be used in setting up the transmitter board. I have shown this circuit several times before and it is the sort of little test item that all radio amateurs ought to have on their work bench. The probe gives peak RF readings when used in conjunction with a multimeter. Use an analogue meter (one with a needle) because most of the tests involve looking for peaks in tuning up the stages — not easy with a digital meter. The little probe can be built on a piece of scrap PCB or Veroboard. It requires a stiff wire to act as a probe and a flying lead with a crocodile clip for the ground connection. The leads between the probe and the meter should be screened wire: if open wire is used false readings may appear from RF pickup on the leads to the meter. Make a tidy job of this little probe it is worth keeping to use in future. A neat layout for this probe appeared in my article on page 369 of *Short Wave Magazine* for September 1982.

The transmitter board is a three stage amplifier using a BD131 in the final stage. The 2N3904 pre-driver and the BFY51 driver stages are both keyed; these two stages are linear and tuned. This may seem a bit of a luxury but the small cost of an extra stage, rather than a single Class-C stage, does aid stability. Also linearity is useful since the final stage would also amplify harmonics and nasties which are undesirable even at low power levels. The bandwidth of the amplifier strip would be somewhat limited by the tuned circuit if the whole band were being covered, but since for CW operation only 100 kHz of the band is required, tuning for a peak in the centre of the band gives very little fall off at either end of this sector. I tuned my stages for a peak on 3560 kHz the QRP calling frequency. The power amplifier is the inexpensive BD131; although intended for audio applications, it functions well as an RF amplifier beyond the required frequency range of this transmitter.

The choice of devices for TR1, TR2 and TR3 had more to do with what was available to me rather than theoretical worthiness.

A whole range of devices similar in characteristics to the ones used here could be employed. In fact I originally built the power amplifier stage using a surplus CB driver transistor, and a BLY33 had a little turn in the circuit with good results. The BD131 requires a heatsink. I wanted a compact board so I made a small heatsink out of aluminium sheet, cut to about twice the size of the device but somewhat longer. The end away from the leads is turned up to give a fin about half an inch out from the board. Although small, this heatsink gives sufficient protection to the BD131 in this application.

The two tuned stages both have inductors wound onto T50-2 cores (see footnotes for supplier) and are tuned with a parallel combination of a fixed capacitor and a small semi-airspaced trimmer. Both coils are wound in the same way with a primary of 40 turns of 28 s.w.g. wire. This is close wound — it has to be to fit the core and leave a small gap in the centre. The link winding is added after the main winding is completed and is wound using PVC covered single-strand "hook-up" wire. The low pass filter (L3, 4, 5 and C9, 10, 11, 12) is somewhat of an overkill. The doubly tuned driver stages could mean that a single stage low pass filter would be enough but I now use these 7-element filters, of W3NQN, as standard in my QRP power amplifier stages. Perhaps it is a bit of a belt-and-braces job but the values are all

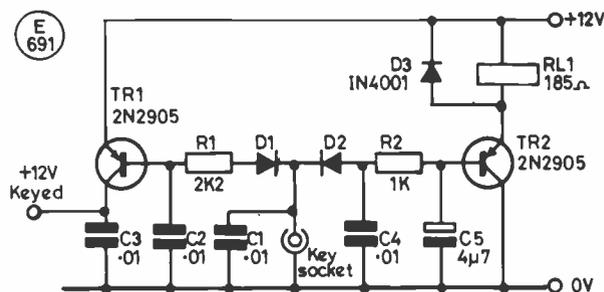
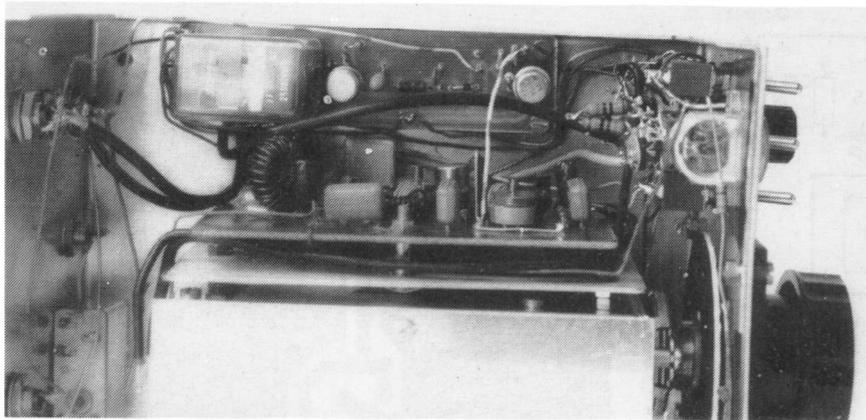


Fig. 6 CHANGEOVER AND KEYING CIRCUIT

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Detail of the TX80 Changeover Board, also showing Transmit Board from the edge

Photos: Jo-Anna

standard, and for the few extra bob the signal should be much cleaner.

The capacitors used in the low pass filter section (C9, 10, 11, 12) should be either silver mica or polystyrene, the small metalised ceramic plate capacitors are not adequate even at these low levels of RF power. These small capacitors were, however, used for C3 and C6 and for many of the other capacitors, these being less critical. The prototype used polystyrene capacitors in the low pass filter.

Building the Board

The layout for the printed circuit board is shown in Fig. 5. This gives both component overlay and copper track layouts. This board is a minimum etch board, that is as much copper as possible is left on the board to act as a ground mat to aid screening. The best approach is to build the stages one at a time, beginning with TR1, and then test and peak up each stage as the construction proceeds. When a stage has been completed the VFO output should be applied at C1 and the stage (or stages) powered up and tested. So build the TR1 stage and check the output at the link output of L1 with the RF probe and a meter on a low voltage scale. The trimmer CT1 should give a distinct peak in the output when rotated. Set the trimmer for maximum output and then proceed to the next stage. Repeat the test by measuring at the link output of L2 and peak the output again. The PA stage is somewhat different in that it should be run into a load to avoid damage to the transistor. A 50-ohm (or so) resistor capable of dissipating a couple of watts can be the load. The resistor must be carbon (non-inductive) and will probably be made from combinations of other values — say two 100-ohm resistors in parallel. The output can be checked at the collector of TR3. The radio frequency choke (RFC) is homemade from 10 turns of 32 s.w.g. enamelled copper wire on a small ferrite bead.

When this board is completed, most of the transmitter is finished and it can be tested into a power meter, if one is available. Also, monitoring the transmitter keying is a useful check to make using a receiver tuned to the frequency. In all these tests the output must be run into a dummy load. Although this constitutes the bulk of the RF circuitry a fair amount of extra switching and monitoring circuits have to be added.

The Changeover Board

Fig. 6 shows the arrangement used to key the transmitter and to switch over from transmit to receive. The option chosen is the one sometimes called "semi-break-in". When the key is pressed down the transmitter is switched into operation via a DC switch and a second DC switch operates a relay which changes the antenna from the receiver to the transmitter and, in this circuit, restores the VFO from an offset position on receive to the required frequency for transmit.

TR1 is the keying switch. It is a simple *pn*p DC switch circuit. Why not key the transmitter directly? Well — in the transmit board two stages are being keyed, both in their power lines. This could be done directly with a key but that would mean having 12

volts across the contacts which does not suit many keyers and can give some RF problems in the key leads. This system allows the transmitter to be keyed with respect to ground. Also the switching stage has a little shaping applied to the keying characteristics in the form of C1 and C2, with R1. This gives a rounded and more pleasant sounding keying action.

The transistor, TR2, another *pn*p DC switch acts to pull in and release a relay. The relay contacts perform the change over functions from transmit to receive. This stage has a built in time delay. R2 and C5 ensure that although the relay pulls in as soon as the key is pressed, there is a slight delay when the key is released before the relay contacts fall back. The purpose of the delay is to give a convenient switching action. If the relay acted too quickly it

Table of Values
Fig. 7

R1 = 2K2	D1, D2 = 1N914
R2 = 1K	D3 = 1N4001
C1, C2, C3 = 0.01 μ F, min. ceramic plate	TR1, TR2 = 2N2905
C4 = 4.7 μ F, tant.	RL1 = 12v relay (about 185-ohm coil)

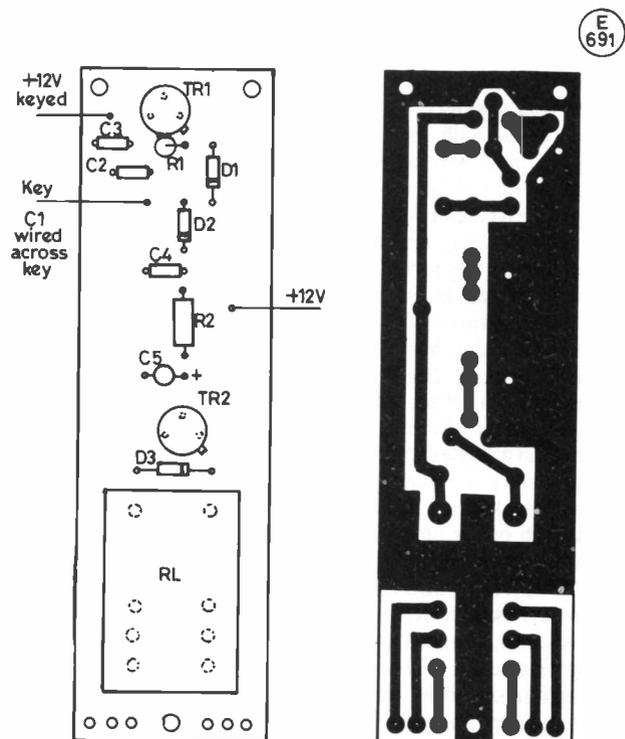


Fig. 7(a) COMPONENT LAYOUT Fig. 7(b) TRACK SIDE CHANGEOVER BOARD

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Front view of the completed TX80 Transmitter

would clatter in and out with the keying. The delay is such that at normal keying speeds the relay remains in during the gaps between words and letters and falls out about half a second after keying

stops. The delay can be changed by increasing or lowering C5.

The layout for the change-over board is shown in Fig. 7. The layout is simple but may have to be adapted to suit the available relay connections. Any small two-pole changeover relay capable of easily pulling in at 12 volts DC can be used in this circuit; the one used here has a coil marked 185 ohms. There are many suitable relays around both in mail order catalogues and the surplus market. The PCB layout for the contacts may not be the same as shown here. An alternative to using PCB tracks is to cut a hole in the board or have the contacts of the relay hang over one end of the board; the wiring can then be applied directly to the contacts.

A simple board to test. Remember in wiring up that these are "upside down" *pnp* transistors, so take care on lead placements. When the power is applied the relay will probably just click over and fall back as C5 discharges. Shorting the key socket to ground should make the relay pull in and lifting the connection to ground allows the relay to return back to normal after the short delay. The keying action can be monitored with a meter at the top of C3: the 12 volt "keyed" point. Whenever the key socket is shorted, 12 volts positive, ought to appear.

But if all is going well so far, relax the hard bit is over. Part 2 will describe the SWR circuitry, the Offset circuit, the switching and how to box the transmitter up into an attractive finished piece of equipment.

TX80 Component Sources:

VFO Box: Aluminium Box type A8 from *Minfordd Engineering*, Sun Street, Ffestiniog, Gwynedd LL41 4NE (076676-2572). T50-2 cores from *SMC (TMP Electronics)*, Unit 27, Pinfold Workshops, Buckley, Clwyd CH7 3PL (0244-549563). Or *Cirkit Holdings PLC*.

CONTEMPORARY BRIEFS . . .

IN the November, 1985 issue there was a comprehensive review of a *Cirkit* catalogue. The *Spring 1986* edition of the *Cirkit Electronic Constructor's Catalogue* has just been received and follows the same format as the previous issues. There are some interesting additions to the stock and, in view of the release of the six metre band, probably the most attractive is the introduction of a transverter kit designed by Tony Bailey, G3WPO, for use with a 28 MHz transceiver drive source. The receiver section's claimed performance is a 4dB system noise figure, -129dBm sensitivity for a 10dB S+N-to-N ratio in an SSB bandwidth and a 14dB overall system gain. The transmitter part's performance claims are 0.5W p.e.p. SSB output and 1W on CW and FM for as little as 1mW drive, but up to 1W drive can be used attenuated through a PIN diode network. Automatic, variable delay change-over or hard p-t-t switching is provided and a double-section low pass filter reduces harmonic output to better than 45dB down. Intermodulation distortion at 0.5W p.e.p. is better than 35dB down. The kit costs £50.43 plus VAT and there is a four metre version at the same price. 15-20W linear amplifiers are available for both bands at £43.30 plus VAT each and all kits require +12 to 13.8v DC supply.

Other new G3WPO design kits are a filter set providing six cascaded filters for the HF bands relay switched and with 100W rating, and an "up-market" parametric equaliser similar to devices found in professional recording studios. This latter design can be used in both the transmit chain or the receive path and has a built in 2W audio amplifier. Judging by some of the horrible signals heard on the amateur bands, this device could benefit many operators if correctly set up.

Some readers may recall those very expensive antenna tuning units marketed by a company called *TAU*, a year or two ago. The

company ceased trading but *Cirkit* appear to have acquired stocks of components and are offering them at more sensible prices. The heart of this ATU was a "roller coaster" inductor and this can be bought separately for £28 plus VAT. Turns counters, cabinets and baluns are also available for use with this ATU kit. Other new items include toroid mounts and potting cups for PCB work, PCB drafting tapes and new *Toko* coils. In the larger hardware department there are some peripherals for the *Amstrad* CPC464, CPC664 and CPC6128 computers, a hand-held 27 MHz direction finder as used by *British Telecom*, and the *Crotech* 3031 oscilloscope. The catalogue contains four vouchers, valid until May 31, which can be redeemed for £1 against each £15 of the total order value excluding VAT, representing up to 6⅔% discount. This latest *Cirkit* catalogue is available in the larger newsagents at £1.15 and is always a worthwhile investment.

MAINS borne interference can be quite a problem when using sensitive electronic equipment. **Messrs. A. F. Bulgin & Co. P.L.C.** have listed their latest mains filters in a new, twelve page brochure giving all necessary mechanical and electrical information. Such filters will also attenuate any RF from equipment being fed back into the mains wiring. For further details contact the company at Bypass Road, Barking, Essex IG11 0AZ. (Tel. no. 01-594 5588. Telex: 897255).

THE *British Standards Institution* has just published a new part of BS5817, Audio-visual, video and television equipment and systems. This part 3 is **Specification for connectors for the interconnection of equipment in audio-visual systems**. It can be purchased from the Sales Dept., B.S.I., Linford Wood, Milton Keynes MK14 6LE, for £16.50 or £6.60 to subscribing members.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THIS month has seen your scribe busily taking all his aerials down, making the painful preparations for the move of QTH; so I don't know from personal experience much of what's been going on around the bands. As yet I haven't put up an aerial of any sort at the new address, even for VHF, but at least I have seen the rig safely here and will soon have it in the new shack; and, praise be, the roll of coaxial cable from which the first aerial will need to be fed was one of the first things to come to light — so progress shouldn't be too slow! Provisionally, I have permission for a homebrew two-stage crank-up, tilt-over mast on which to sit a tri-band, and the drawings for the latter are at the 'design proving' stage (meaning the first one built won't go together!). However, doubtless some small modifications will handle the problems that may crop up.

The Bands

Not a great deal can be expected from the higher bands at this stage in the sunspot cycle; but Top Band and Eighty tend to be somewhat better at sunspot minimum.

The Mail

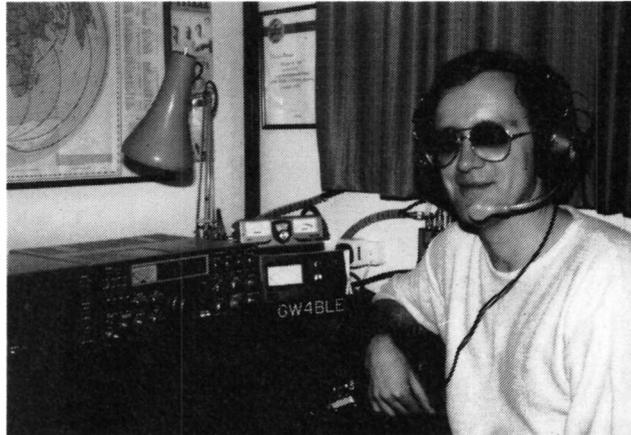
This, masters, is where we have considerable problems — to put it mildly! The packet of mail containing your contributions to this month's column was sent, by 'Royal Mail Special Delivery', from the Welwyn office to your scribe's new address; but by the time the piece had to be written the packet had not yet arrived . . . disaster indeed. So — at least two days in the post, though the Post Office guarantee delivery the day after posting. Well, well!

All I can do is apologise to readers and contributors for the almost total blank this month, and ask contributors to send in their reports for next time, as usual. Presumably the missing mail will eventually turn up, in which case all the material that can be used from it will be added to next month's column.

Crystal Ball

If you come across 9J2JM — who has appeared in some DX lists of late — then you bought a pup. *TDXB* notes that the Matero Boys School station is at present off the air for want of a qualified operator.

Another one to suffer the attentions of our Phoney Friends was BV0BG, the expedition set-up on Taiwan; they have



Regular "CDXN" contributor Steve Cole, GW4BLE, pictured at his home station. Equipment is a Trio TS-930S and Heath SB-220; aerials are a Hy-Gain TH-5 plus loop and wire antennas

been reported pirated at the CW end of Eighty, though it is understood that the signal heard at the other end was the real one.

If all goes well, by now the Carolines will be activated by KC6DM and KC6HM, Dennis and XYL Holly; we have it that they would sign /EC or /WC to indicate whether they were on Ponape or Balau.

"CDXN" deadlines for the next three months:

April issue—March 6th

May issue—April 3rd

June issue—May 8th

please be sure to note these dates

March was reputed to be the time to look out for ZLIAMO operating from Tokelaus . . . this one should be hunky-dory, as ZLIAMO is not in the 'busted flush' business.

We notice that with things in a low state, sunspot-wise, W1HDQ is looking for reports of hearings of ten-metre beacons at anything resembling DX, for the next year or so; such reports will do something to help fill in the gaps in our knowledge of

propagation, and thus are part of a scientific experiment in effect. Notes to Ed Tilton, W1HDQ, PO Box 5529, Spring Hill, Florida, U.S.A.

S92LB on Sao Tome seems to be active according to various bulletins, and we hear that his cards are O.K. for DXCC; as for S9OAS we understand he is a doctor on a swing through Africa in the course of his work, any may well appear from Togo, the Congo, Benin and possibly Upper Volta; QSLs to his home IT9AZS call.

Lloyd and Iris Colvin, W6KG and W6QL, wrapped up their 3D6QL activity on January 8, with some 6500 contacts in 130 countries, but no word has yet come to your conductor of their next stop or plans.

Early Closing

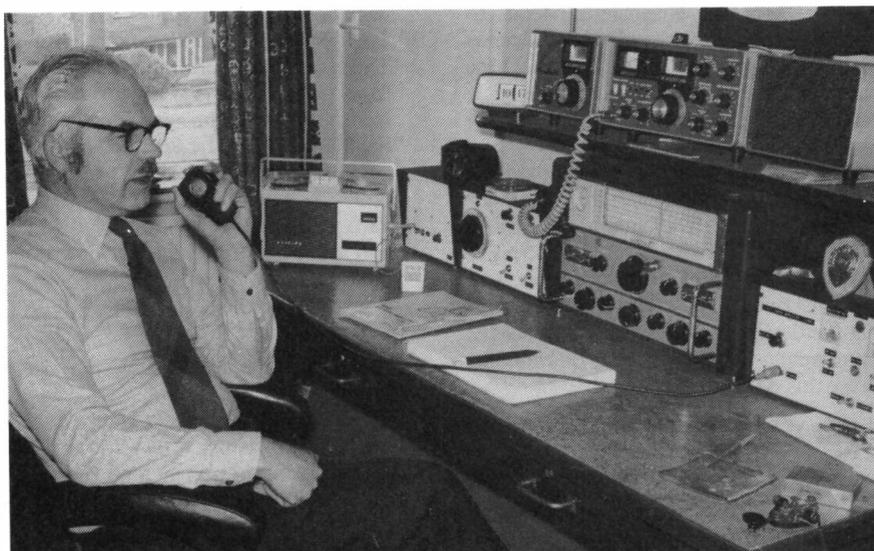
That seems to be about that for this time. For next month, the deadline is in the 'box' and is, of course, the date by which your letters should have arrived, addressed as always to your conductor, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Let's have a bumper bundle of reports for next time, to make up. 'Bye now — and sorry again for the hiatus. (You could always use the time you would have spent reading "CDXN" to give the old mower a bit of an early once-over . . .)

"Beyond the Call"

G3BA

"THE magic of the wireless caught up with me in 1924", says Tom Douglas, G3BA. At the age of six he was given a crystal set as a Christmas present. Being a canny Scot he was soon building crystal sets in cigar boxes to sell to his mates so as to raise capital for components for some experiments with valves. These eventually led to the building of the famous Scott-Taggart designs in the early 1930s. In 1934 a short wave convertor was added to the system and Tom enjoyed listening to such stations as W8XK, W2XAD and, on Sundays, VK2ME with the famous Kookaburra bird interval signal.

P.o.W. life started at Changi and was followed by over three years on the infamous Burma-Siam railway including a spell working around the bridge on the River Kwai. To alleviate "the horror and despondency" of life under those conditions Tom fell back on his pre-war expertise of building radios from odds and ends and several clandestine sets were soon in operation powered by torch batteries obtained for them by Nai Boon Pong, an underground agent of the Allies. The BBC Overseas Service was copied right up to the news of the dropping of the atom bomb. Tom says that this event saved the lives of thousands of Allied



All this was still broadcast band stuff but around this time two local amateurs "diverted my attention" to the 20 and 40 metre bands and persuaded Tom to get an artificial aerial licence and the callsign 2CNI (no 'G' prefix then) was issued. Some of his earliest experiments were with the 60 MHz circuits produced by Eddystone, and Tom became hooked on VHF.

In 1936 Tom qualified as a sea-going wireless operator and with this ability also came the full call of GM3BA. His excellent Morse got him invited to join the First Class Operators' Club and he is, in fact, one of the earliest members of that club. He decided that life on the ocean wave was not for him and so joined the BBC as a junior engineer at Daventry.

Tom married in 1939 and says that, "The following day war broke out". (Surely the most compelling objection to marriage in modern history?). Tom took the King's Shilling and joined the Royal Signals unit at Edinburgh Castle. By 1941 Tom was commissioned and waiting to go abroad. The unknown destination turned out to be Singapore where he was in charge of various radio links until the Japanese arrived, and Tom went "in the bag" on the 15th February 1942.

troops whom the Japanese had instructions to "eliminate" if there was an invasion.

After the war Tom returned to Daventry and after steady promotion became Engineer-in-Charge at the BBC television station at Sutton Coldfield. He remained there until retiring in 1977. Around 1949 he became very interested in two-metre operation and was one of the first people to develop the modern technique of using transvertors, which in turn made SSB available to the VHF man, and doing much to popularise the band.

In 1970 he became involved with the RSGB on administration and membership of the VHF Committee, of which he was a regular member until a few years ago. Now he is one of the RSGB newsreaders, is very active on the local Raynet scene, and is certainly one of the best known speakers on the club circuit.

If you would like to appear in this feature, please send relevant details and a good, sharp photo of yourself (not necessarily B/W) to the Editor, marking the envelope "BTC". Anyone and every-one is welcome to contribute.

The G3ISD Low-Cost Linear Amplifier

Part 1

using readily available components

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

WITH the increasing complexity displayed in amateur radio equipment, the scope for home construction tends to become reduced, but in spite of this, there remains several areas where home construction remains practicable and feasible. One of these is the construction of linear amplifiers, and this article describes the writer's second entry into this field, the first having been described elsewhere [1, 2].

The low cost concept is highly relevant, because paradoxically, the fact that the major components required for this or similar projects are no longer easily available from manufacturers or distributors, means that they will be the spoils of attendances at rallies and junk sales, and raids on the junk boxes of cooperative friends, resulting in a lower cost than would otherwise be the case.

It is for this reason that the design must be readily duplicated, and that none of the components, including the valves, must be unique or even rare. I think this object has been achieved.

The Circuit

The circuit is the well-tryed and proven one using two 813 valves in parallel, triode connected, in grounded grid.

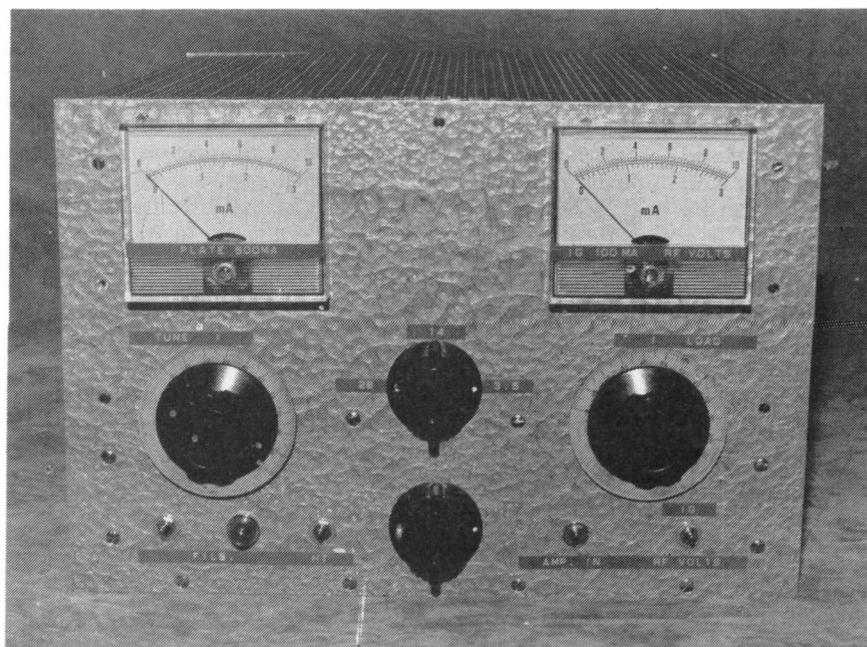
The advantages to my mind, are:

- 1) The valves are relatively inexpensive. (Ignore some of the advertisements you see.)

- 2) The valves are very robust, and with their large carbon anode will withstand a fair amount of maltreatment.
- 3) Their cooling requirements are modest and uncritical.
- 4) The grounded-grid triode connection is inherently stable, easy to get going, and in my experience has not needed neutralising. It dispenses with the need for a (stabilised) screen supply, and the 813s may also be operated at zero bias, although there are advantages in a few volts of operating bias as provided here [2].
- 5) Two valves in parallel may be run at 1000 watts input on SSB, and are thus well underrun when operated at the U.K. legal limit.
- 6) I have five of them!

The disadvantages, if any, may be considered to be the following:

- 1) The valves are physically large. (Does it matter?)
- 2) The filament power is 50 watts per valve. (Is it so important?)
- 3) The high output capacitance of the 813 results in higher-than-optimum tank circuit 'Q' on the 21, 24, and 28 MHz bands, resulting in greater tank coil losses, but see under "Pi Tank Circuit" below.
- 4) They need an anode supply of around 2000 volts to make the



Front view of the G3ISD Low-Cost Linear Amplifier

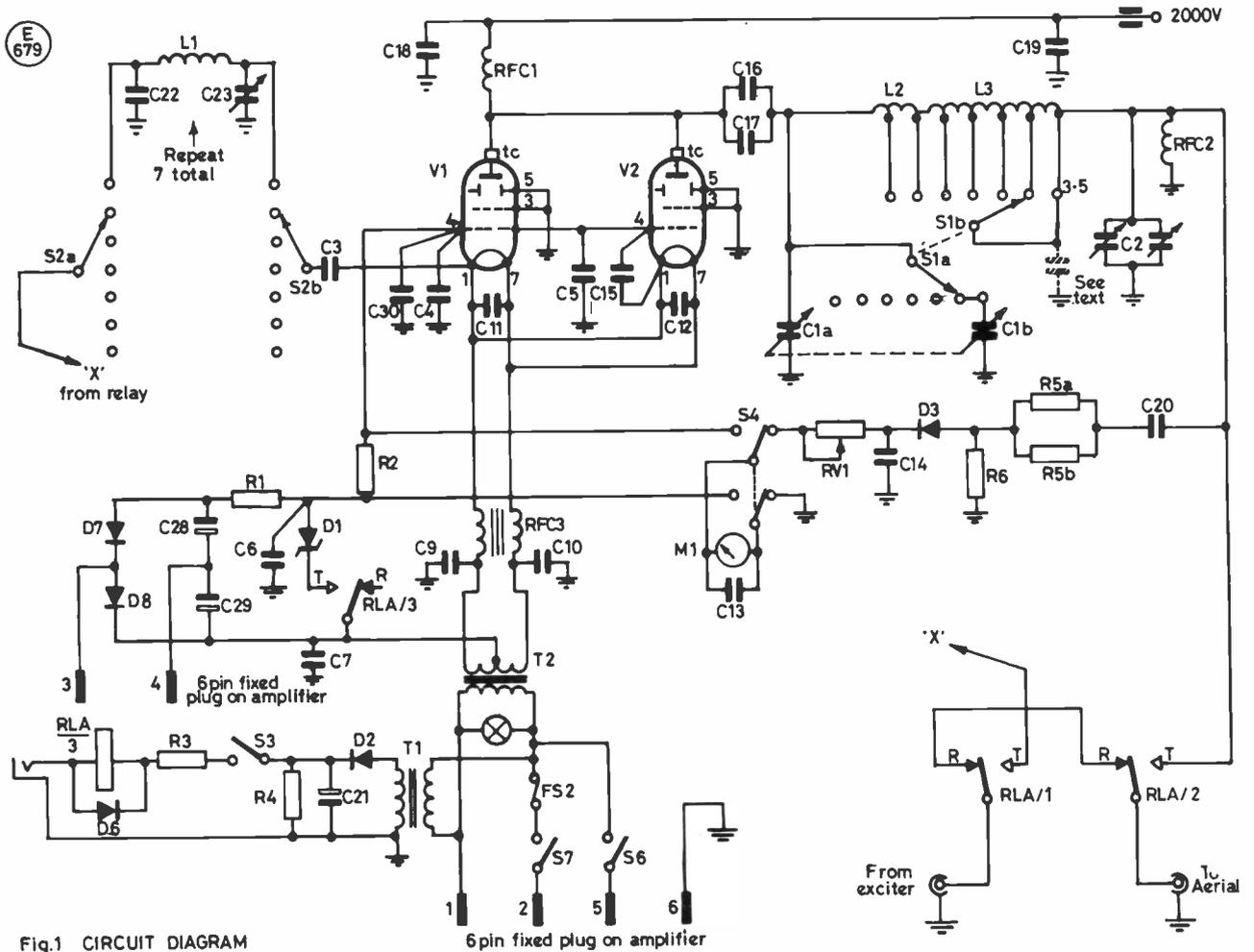


Fig.1 CIRCUIT DIAGRAM

Table of Values
Fig. 1

R1 = 5K, 3W wirewound (or 1K5 3W, see text)	C26, C27 = 3 x 700µF 400V (but see text) elec.
R2 = 100mA shunt to suit meter	C28, C29 = 100µF 100V elec.
R3 = 22R, ½W	C30 = 0.001µF 50V d/c
R4 = 1K, ½W	RFC1 = see text and Appendix 1
R5 = 2 x 47K, 1W, in parallel	RFC2 = 1mH or 2.5mH, 300mA
R6 = 1K2, ½W	RFC3 = see text
R7, R8 = 6 x 2M2, 1W	L1 = see Table 1
R9, R10 = 6 x (2-330K, 1W, in parallel)	L2, L3 = see Appendix 2
VR1 = 22K, 0.5W linear	D1 = 5.1V, 1.3W zener diode
C1A, C1B, C2 = see text	D2, D6 = 1N4002
C3 = 0.01µF 400V, carbonate or polyester	D3 = OA91
C4, C5, C6 = 0.01µF 400V, disc ceramic	D4, D5 = 6 x 1N4006
C7 to C10 = 0.047µF, 50V d/c	D7, D8 = 1N4004
C11 to C14 = 0.022µF 50V d/c	T1 = 12V 100mA
C15 = 50pF silver mica	T2 = 10V, 10A centre tapped
C16, C17 = 500pF 20kV encap. ceramic (or 0.001µF 5kV disc)	T3 = see text
C18, C19, C20 = 0.01µF 3kV d/c	RLA = 12V, 3-pole changeover, see text
C21 = 220µF, 35V elec.	M1 = 0-500mA
C22, C23 = see Table 1, 350/500V silver mica	M2 = 0-1mA
C24, C25 = 6 x 0.01µF 1kV d/c	N = neon lamp
	S1A, S1B, S2A, S2B = 2-pole, 7-way, see text
	S3, S6, S7 = SPST toggle switch
	S4 = DPDT toggle switch
	S5 = DPST toggle switch

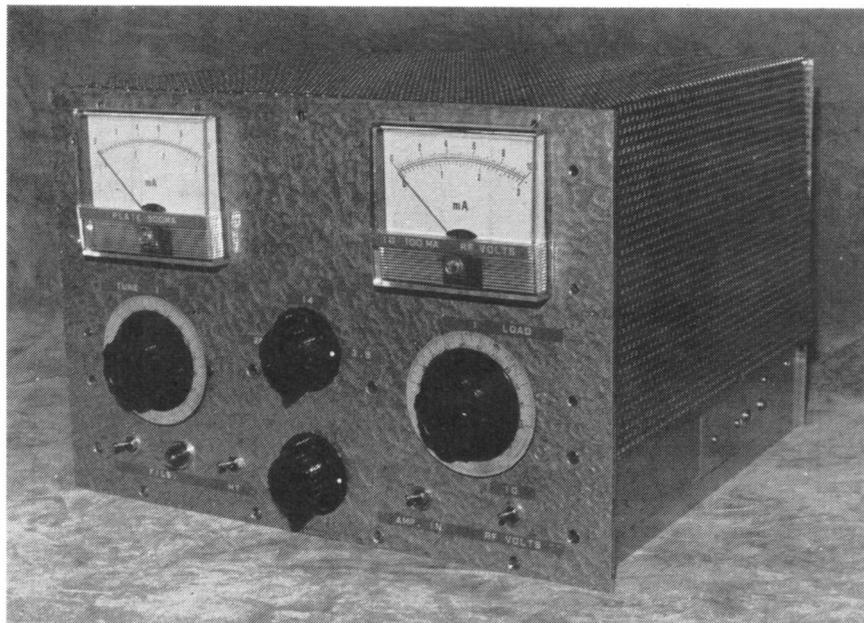
effort worthwhile, so this is not a project for the inexperienced or the careless. (Death is permanent.)

5) The grounded-grid mode of operation needs more driving power than a grid driven amplifier, but this is a theoretical objection in this context as the maximum drive required of about 50 watts is easily provided by the average transceiver. Some of the driving power in a grounded-grid amplifier is fed through and contributes to the output.

Input Networks

The component values for the input networks are given in Table 1. These low 'Q', broadly tuned circuits match the 50-ohm output of the transceiver to the nominal 200-ohm [4] input of the 813s, and are essential if the transceiver has a solid-state output. There are also other benefits deriving from a tuned input [2].

Although the input networks component values are not especially critical, they have to be such that matching is achieved, resonance is obtained, and the 'Q' is appropriate for the required bandwidth characteristics. It seems that most designs employ two fixed capacitors and an adjustable inductance (per band), but a more accurate match can be obtained if one of the capacitors is also made adjustable. As the output impedance of the transceiver is known at 50 ohms, and the input impedance of the 813s is only a nominal figure of 200 ohms, it is apparent that second capacitor should be the adjustable one. This will avoid the considerable amount of experiment with capacitor and inductance values which otherwise might be required, and makes final adjustment much easier.



 Front three-quarter view

Band	C22 calc..	C22 actual	L turns	C23 calc.	C23 actual
3.5	1700	1800	17	980	750 var. + 390 fixed
7.0	900	1000	13	490	500 var.
10.0	630	680	10	340	500 var.
14.0	440	470	8	245	250 var.
18.0	340	330	7	190	100 var. + 33 fixed
21.0	300	270	7	164	100 var.
24.0	260	—	—	143	—
28.0	220	100 + 39	7	120	100 var.

Table 1. Input Networks (adapted from [3], Fig. 24, p. 11.39). *Notes 1.* Coils are close wound with 24 s.w.g. enamelled wire on 3/8" formers with adjustable iron dust core. (The 3.5 MHz coil is wound with 28 s.w.g.). *2.* C23 'actual' values will be increased by the valve input capacitances of 16pf each and by C15 (50pf). *3.* The 28 MHz coil consists of 7 turns of 18 s.w.g. tinned copper wire, 3/8" internal diameter, soldered directly to the connections of S2. (No iron dust core). *4.* The 24 MHz band has not been included.

Pi-Tank Circuit

The pi-tank circuit constants are easily calculated using the charts, tables and formulae in the various handbooks, and are related to the amplifier plate load and the operating 'Q' of the circuit. A 'Q' of 10-20 is usually considered optimum, and Table 2A gives the values for a load of R_L of 3000 ohms and a 'Q' of 12.

Because of the high output capacitance of the 813s (14pF each), the minimum capacitance of C1, and unavoidable stray capacitance, the minimum attainable circuit capacitance is higher than the calculated values for C1 for bands higher than 10 MHz, and is in the region of 52pF, in spite of the fact that C1 is modified to reduce minimum capacitance (see "Components"). The figure of 52pF is obtained as follows: (valves, 2×14) + (C1, min. 14) + (optimistic strays, 10pF) = 52pF. To provide some adjustment, C1 is set at, say, +5pF making a total of 57pF; C1 is about 1 1/2" clear from the baseplate and is also spaced about 7/8" from the panel, which help to reduce stray capacitance, as also will careful wiring to S1A.

Table 2A is re-calculated as Table 2B, to take account of the higher than optimum values of C1, and also includes the resulting 'Q' values. The principal effects of the higher 'Q' are increased tank circulating current and increased harmonic suppression. Whereas the latter is desirable, the increased circulating current results in lower efficiency because of increased tank losses. These may be reduced by employing a separate coil of heavier gauge conductor for the three highest frequency bands. Too much need

Band	C1	L total	C2
3.5	182	12.45	1076
7.0	91	6.22	538
10.0	64	4.36	377
14.0	46	3.11	269
18.0	35	2.42	209
21.0	30	2.07	179
24.0	26	1.81	157 (This band not included)
28.0	23	1.56	135

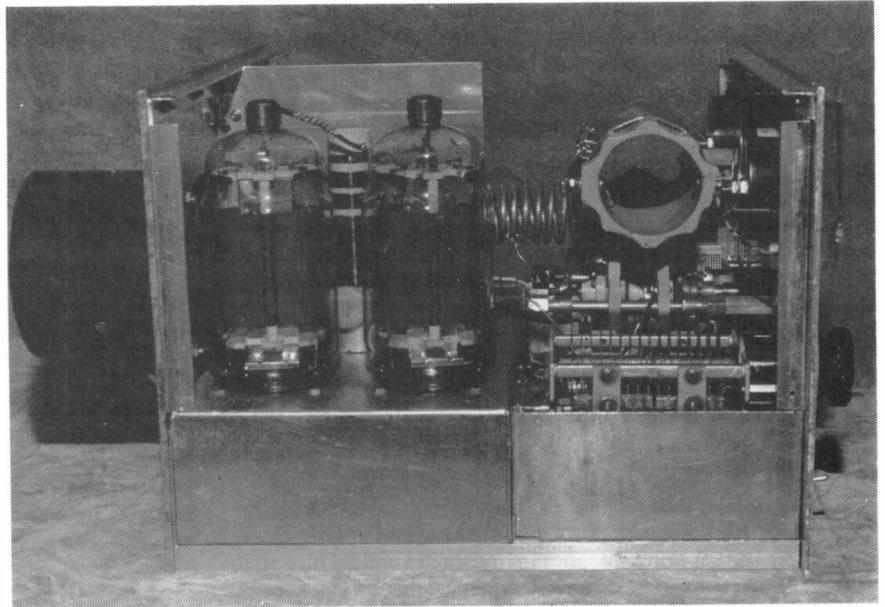
Table 2A. Pi-tank constants (adapted from [5], table 9, p. 6.31). All based on R_L of 3000 ohms and 'Q' of 12: C in pF, L in μ H.

not be made of this however, as the increased losses may be compensated for by increasing the input, as the 813s have capacity in hand, and in any case our licence conditions specify power *output* rather than *input* power.

Biasing

Approximately five volts of operating bias is used, which helps to keep control grid dissipation within ratings [2], and also reduces anode dissipation and therefore heating by a modest amount during transmit periods. Full cut-off bias is applied during receive periods, completely eliminating all anode dissipation which would otherwise be about 150 watts, and also

Left side

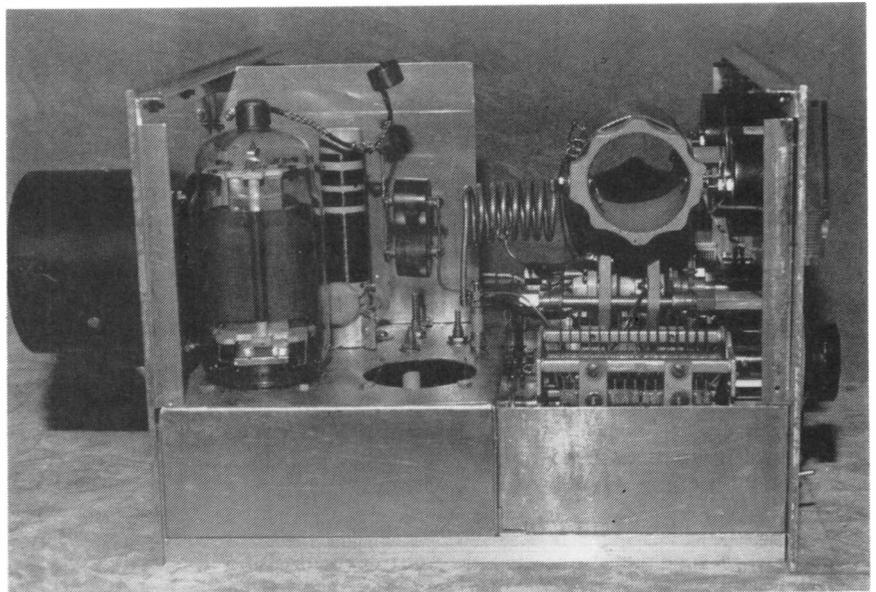


Band	C1	L total	C2	Q
3.5	182	12.45	1076	12
7.0	91	6.22	538	12
10.0	64	4.36	377	12
14.0	57	1.94	336	15
18.0	57	1.30	330	19
21.0	57	1.08	343	23
24.0	57	0.83	340	26 (This band not included)
28.0	57	0.62	337	30

Table 2B. Pi-tank constants (Table 2A re-calculated for minimum circuit C1 of 57pF). All based on R_i of 3000 ohms; C in pF, L in μ H.

prevents the possibility of "diode hash" in the receiver [2]. The cut-off bias applied is about 170 volts, which is voltage doubled from a fortuitous 60-volt winding on the HT transformer. It is certain that far less than this amount would be sufficient, but no tests have been performed. A suitable bias supply should be 65 volts (approx.) derived from a 24v. (12-0-12), 50mA transformer connected in place of the 60v. winding — in which case R1 should be reduced to 1500 ohms, 3 watts.

Left side view, with one 813 removed to show anode coupling capacitors



Metering

Anode current, grid current, and relative RF output volts are indicated, the latter two being switched on the same meter. This not only saves the cost of a meter, but also economises in panel space. There is also a non-essential voltmeter on the PSU, which is a 0-300 voltmeter multiplied up to read 0-3000 volts. Such an instrument if fitted, should have a basic movement of not more than 1mA, otherwise the wattage rating of the multiplier resistance(s) becomes excessive.

Components

Because the realisation of this project depends to a large extent on the acquisition of certain suitable components, a few words on the subject would be relevant.

Variable Capacitors

The component used for C1 is the same model as before, *i.e.* it is taken from a U.S. W.W.II surplus TUSB unit, and has a capacitance swing of approximately 28-160pF. As a means of reducing the minimum capacitance (*see above* "Pi-Tank Circuit"), the stator support bars were sawn through to convert it

into a split-stator capacitor, one section only of which is used for the bands 10 MHz to 28 MHz. A separate pole on S1 parallels the two sections for 7.0 MHz and 3.5 MHz.

The required 182pF for 3.5 MHz is attained when the valve and stray capacitances are included. This capacitor has a plate spacing of 0.06 in. although this is less than the 0.1 in. usually specified for 2000 volts, no trouble has been experienced with flashover. Obviously, generally similar capacitors may be used.

The loading capacitor C2 is a 3-gang component, but a 2-gang one may be used if a fixed capacitor is connected between the 3.5 MHz position on S1B and earth. A suitable capacitor would be 400pF 2500 volt DC working mica type from the TU5B, or a transmitting type ceramic. Selection of a suitable component is important, because although the voltage across it at peak output of 400 watts is only about 140 volts (50 ohms), the current would be about 1.25 amps (for 400pF).

RF Chokes

The anode load choke RFC1 is a critical component because the tank circuit RF voltage appears across it. So that apart from it possessing the obvious qualities of adequate inductance and current rating, it must not on any account be series resonant on, or very close to, any of the amateur bands, otherwise it would very quickly burn out. The choke actually used is a Labgear E.5052 component, made long before the 10, 18 and 24 MHz bands were available, and no longer manufactured, but fortunately there are no series resonances on any of the amateur HF frequencies, including the new ones.

To check for series resonances, short circuit the choke upon itself before installation, and check it using a GDO and frequency counter. Winding details for duplicating this choke are given in Appendix 1. The choke used in the original version of this amplifier has not been checked for resonances in the new bands.

The choke shown on page 6.41 of the "Radio Communications Handbook" (RSGB) appears to be a copy of the National Co. (U.S.A.) Model R175A and is not recommended as, in spite of its complexity, a sample made some years ago proved to be unsatisfactory because of unwanted resonances. The filament choke RFC3 does not appear to be at all critical. The one used here

consists of two 8" × 3/8" ferrite rods cemented together with Araldite, taped with PVC tape, wound with 25 bifilar turns of 14 s.w.g. enamelled copper wire, and taped overall. The ferrite rods are quite brittle, and are liable to break under the strain of winding with heavy gauge wire unless glued together first; single 1/2" or 3/8" rod can be used, between say 6" and 8" long. The number of turns is not critical either, and as few as 15 should be sufficient on the shorter rods.

RF Switches and Relay

The input bandchange switch S2 is not subjected to high RF voltages or currents but it is worth looking for a switch of good quality. On the other hand, S1 has to cope with both high RF voltage and current, and should be selected accordingly. Large contacts, ceramic insulation, and good contact spacing are prime requirements if trouble is to be avoided. The switch used fulfils these requirements; it is a type frequently seen, and the metal parts bear the inscription "F&E Ltd." (Films and Equipments). The construction of some examples of this switch is such that the contacts are assembled to the insulation with very small nuts and screws, and may therefore be rearranged if necessary. Alternatively a switch from the TU5B mentioned above may be used, but as they are single pole, and not capable of being ganged, two would be necessary (one for switching the two sections of C1 and one for the coil switching). The antenna/control relay came from a central heating panel and is very similar to RS Components model 349-541. Any good quality relay should be suitable, and it is not necessary to use separate input and output relays.

Coil Formers

The formers for the input coils are 3/8" diameter of ceramic material with adjustable iron dust cores, and single bushing fixing. They strongly resemble the products of Cambion and J.W. Miller, both of U.S.A., but obviously other makes such as "Aladdin" or "Neosid" may be used, but the number of turns may then need to be modified. Winding details are given in Table 1, but note that the 28 MHz coil is self-supporting, and soldered directly to the connections of S2.

See Appendix 2 for details of the tank coil former.

to be concluded

● ● ● "Practically Yours" ● ● ●

with GLEN ROSS, G8MWR

A couple of months ago I remarked in this column that I had been using an old Hammarlund HQ-170 receiver on the new six-metre band with great success. Several people have written to say that they have tried various other receivers and that generally the results have been disappointing due to a lack of sensitivity. The point was also made by several people that they did not want to use modern solid-state pre-amps as they wished to keep the maximum degree of authenticity in the receiver and that they could use some information on valved units. This is not such a retrograde step as it may at first seem because at 50 MHz a valve pre-amp will give a performance as good as, if not better than, a transistorised one.

The Circuits

Here you get good measure because there are two circuits using different types of valve, plus instructions for converting one of the

designs for use with a dual-gate FET. Both of the designs are capable of letting you hear local electrical noise, which is your limit of usefulness. The second system has the lower noise figure and could be used with some advantage in a quiet location. Compared with most solid-state designs the overload characteristics are very good, either unit will handle signal inputs running into hundreds of millivolts with no problems. Both units feature high 'Q' tuned circuits to significantly limit out-of-band responses which may be quite a problem if a local PMR station opens up. Power supply requirements can easily be taken from the main receiver as the units only require a few milliamps at HT (around 200-250 volts) and around 200 milliamps at 6.3 volts depending on the valve type which is used. If this latter requirement is a problem you can usually get round it by substituting 150 or 200mA panel lamps for the more usually fitted 300mA types.

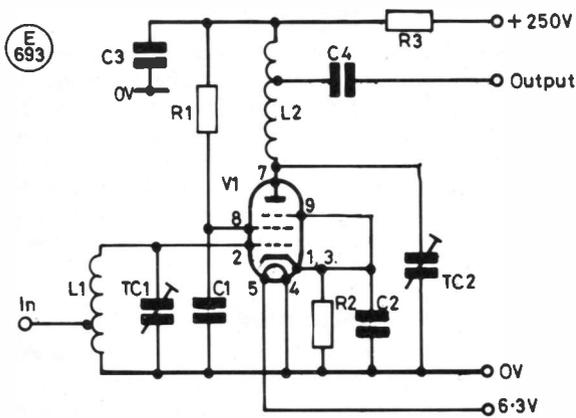


Fig. 1 50MHz PRE-AMPLIFIER USING EF80

Tables of Values

Fig. 1

- R1 = 4K7, ¼W
- R2 = 180R, ¼W
- R3 = 6K8, ½W
- C1 to C4 = 0.01µF, 250V disc
- TC1, TC2 = 15pF trimmer
- V1 = EF80
- L1, L2 = 10 turns, 20 swg, ½" dia., ⅝" long, tapped at 2t

Fig. 2

- R1 = 82R, ¼W
- R2, R3 = 220K, ¼W
- R4 = 4K7, ½W
- C1 to C4 = 0.01µF, 250V disc
- TC1, TC2 = 15pF trimmer
- V1 = ECC88
- L1, L2 = 10 turns, 20 swg, ½" dia., ⅝" long, tapped at 2t

Note: to use dual-gate FET in this circuit, connect: source to pin 8, G1 to pin 7, G2 to pin 2, drain to pin 1, and reduce supply to 12 volts.

in your local old timers' junk boxes; take a lesson from the Rev. Dobbs and indulge in some scrounging!

So that our more modern readers can catch up with all this top technology I shall include in brackets the equivalent connections for a dual-gate FET. L1 and TC1 form the input tuned circuit with the aerial tapped in for correct matching; the signal is then taken to the control grid of the valve (G1). The cathode (source) is taken to earth through R2 and the combined anode and screen current flowing through this resistor make the cathode a volt or two positive with respect to the grid. Looked at the other way, the grid is negative with respect to cathode and is therefore correctly biased; C2 decouples any RF from the cathode. Resistor R1 drops the HT voltage to the correct value for the screen grid (G2) and the capacitor C1 decouples any RF present on this electrode to earth. The suppressor grid (no FET equivalent) is connected to the cathode and is used to trap any secondary emission from the anode. The resistor R3 and capacitor C3 are used to decouple the tuned circuit L2 and TC2 from the supply line. The trimmer TC2 is connected from anode (drain) to earth, but due to the effect of C3 is, from an RF point of view, connected directly across L2. The capacitor C4 provides a DC block on the output and is tapped into the coil at a point which provides a low impedance output to the main receiver.

Double Triode

This circuit (Fig. 2) is based on another readily available valve, the dual triode type ECC88. It is used in a simplified version of the "cascode" configuration. This is a circuit using the two valve sections in series across the supply line with the first section being used as a grounded cathode (grounded emitter) stage and the second one being in grounded grid (grounded base). The purpose of most components is obvious from the description of the pentode stage, the only real difference being that the grid (base) of the second stage is fed through a voltage divider set to give half supply volts at this point and so correctly bias the second stage.

Construction

Each circuit is built on the lid of a small diecast box, about 4 x 2 x 1 inch in size with the valve holder mounted centrally. The box completes the enclosure when the unit is finished. Both units should be stable without a screen as the two tuned circuits are laid out in such a way as to ensure minimum coupling between them. However if you want to be on the safe side a screen can be fixed vertically across the centre of the valve holder and fixed with a nut and bolt at each side. Any regeneration will give an increase in gain accompanied by a worsening of the noise figure. Earth tags should be fitted under both valve holder nuts and bolts and also at the earthed ends of the trimmers. All earth leads should be kept as short as reasonably possibly.

Alignment

Connect the pre-amp to the main receiver and pick up suitable voltages from the receiver or an external power supply. Connect an aerial to the pre-amp. Now tune to the centre of the band and adjust TC2 for a peak in noise from the loudspeaker. At this point it should be possible to tune TC1 for a noise peak, but the better way is to tune to a weak signal in the band and adjust TC1 for the best signal-to-noise ratio. Do not adjust for highest S-meter reading as maximum gain and lowest noise performance rarely coincide. It will usually be found that TC1 has to be set slightly LF of the maximum gain point. The ultimate test is to connect a resistor in place of the aerial and note the noise output; now disconnect the resistor and connect the aerial when you should find an increase in noise, because you are now hearing local electrical noise.

Eagle-Eyed?

Did you spot the similarity between the cascode unit and a standard dual-gate FET design? If you want the solid-state version simply build the unit without the valve, install the FET and reduce the supply volts to around twelve.

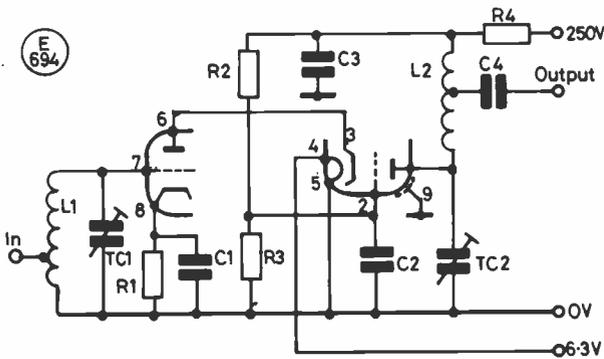


Fig. 2 50MHz PRE-AMPLIFIER USING ECC88

Pentode

The first circuit is designed around the valve type EF80 (Fig. 1). These were used in prodigious quantities in the early TV sets which operated at 50 to 60 MHz and so are ideal for our purpose. The fact that you can buy them at rallies for about 10p each is also a good feature, as is the fact that there must be hundreds of them

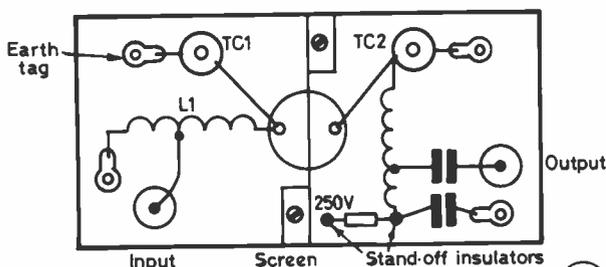


Fig. 3

E 695

EQUIPMENT REVIEW

Alinco ALM-203E Handheld Transceiver

GLEN ROSS, G8MWR

THE two-metre handhelds from the major manufacturers are well known to most people but this unit comes from a source which is better known for its linear amplifiers. The opportunity to have a unit for review was too good to miss and our thanks go to *I.C.S. Electronics of Arundel* for making the unit available.

Specification

The frequency coverage is 144 to 146 as a transceiver plus 150-160 MHz on receive only. Transmit power is switchable between 3 watts (5 watts using an external supply) and 0.1 watt on the low power position. Receive sensitivity is quoted as $0.3\mu\text{V}$ for 20dB quieting or $0.2\mu\text{V}$ for 12dB Sinad. Frequency coverage is in fixed steps of 12.5 kHz over the whole range. A nicad pack is supplied with the unit and there are optional packs for the use of dry cells. There is a ten channel memory with battery backup, memory and programmable scanning and the ability to use non-standard repeater offsets. On receive a battery saving function is available.

Controls

The unit is driven by a 17-button keypad, no less than nine switches and two rotary controls. The display is in the form of an LCD panel which as well as showing frequency also displays the status of various functions. There is a meter on the top panel which is used to display signal strength and power output and there are also sockets for the connection of a speaker mic. The battery pack is a slide-on unit that fits vertically behind the 'sandwich' speaker. The usual red and green LEDs are fitted just above the display panel to indicate Tx and Busy channel.

Driving It

The LCD display is of reasonable size and is easily read in average light conditions. For night use it, and the meter, may be internally lit. The lower edge provides indicators of memory status while the left edge shows key lock and battery save and the right edge indicates program scan, memory scan and, on transmit only, low battery.

Perhaps the strangest point is that to change from normal Tx/Rx use to the 150-160 MHz band one has to remove the battery pack to get at the switch although an indicator on the back of the switch unit shows through the front panel! There are two buttons for tuning up and down from any given frequency which provide very fast tuning of the band. There does not seem to be any way in which this can be tied-in to the squelch, so one normally overshoots the channel by a couple of steps and then has to prod the button a few times to get to the right spot.

The battery save system is brought into play by a front panel button and when in use it monitors the channel every 5 seconds for a period of half a second. These periods are not programmable, as on the FT-209, and in these days of quick calls the off period seems to be excessive. It is also not possible to tune the rig while the battery saver is on.

Repeaters

The repeater shifts are set, plus or minus, by a slide switch on the front panel which only comes into use after the mode switch has been set to duplex. The circuitry is such that it is impossible to transmit out of band. The memory buttons do not contain information other than the frequency and so these switches must be reset every time you move from repeater to simplex. Non-standard offsets can be used by programming the required offset into memory channel zero. The tone burst is brought up using a top panel switch.

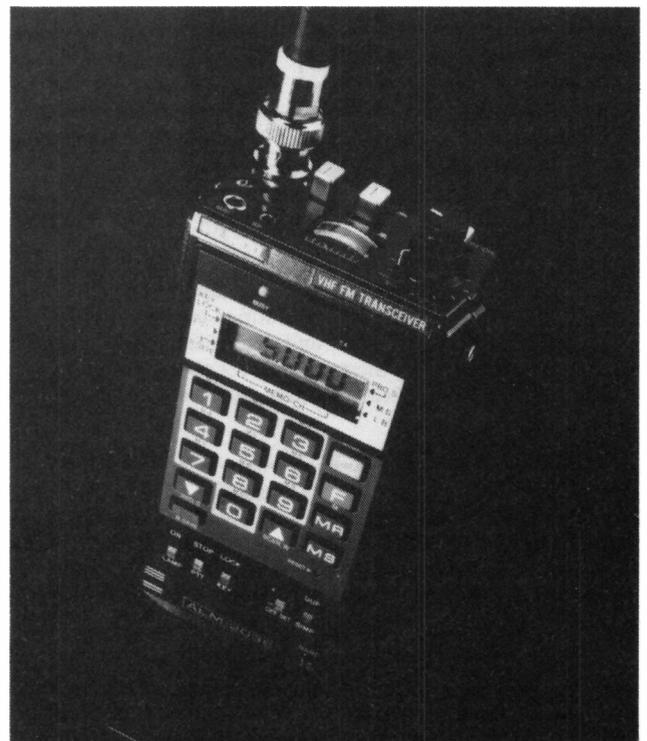
Scanning

The scanning system can be set to operate on the memories or the scan limits may be programmed in. When using memory scan the unit only scans the loaded memories and stops when a signal is found, it then sits on the channel until two seconds after the signal ends. The system on program scan operates in the same way starting at the low frequency end of the scan. There is no provision to exclude selected memories from the scan and the inability to have an automatic rescan after a few seconds pause is a real pain because if there is a local station on, or one of the memories contains the local repeater, the scan is going to stop every time it hits that spot and the only way you can restart it is to press the button. Scanning speed is around half-a-second per step which seems about right.

Performance

On transmit the power specifications were obtained right across the band with no problems. Deviation was fairly accurately set but reports from stations contacted indicated that the transmission was 'toppy'. Under noise reception conditions this would be a distinct advantage and in any case is a matter of personal preference. The power reduction was to approximately 0.1 watt and this reduces the battery consumption from 900mA to 220mA. The supplied nicad pack is rated at 450mAH and full power operation soon puts a dent in it.

On receive with full audio the consumption is around 150mA falling to 35mA when squelched, which by modern standards is high. It can be further reduced to only 5mA by using the battery saver whilst monitoring a channel. The receive sensitivity was



good and well balances the transmit capability. A nice plus feature was that the S-meter actually gives a reasonably sensible indication rather than the more usual 'there, not there' variety.

Circuitry

The receive circuit starts with two bipolars in a grounded-emitter/grounded-base configuration rather than the usual dual-gate FET. This is followed by a three-section filter at signal frequency which is varicap tuned. The FET mixer is followed by two ceramic roofing filters at 10.7 MHz and after the second mixer a ceramic filter at 455 MHz. The overall result is a receiver which is comparatively immune to both out-of-band and adjacent channel signals even at 12.5 kHz spacing. In the review sample the filtering was a little asymmetric with the result that strong local signals operating 12.5 kHz lower were audible whilst the same signal when 12.5 kHz higher was not. This, however, can not be seen as any sort of problem for the simple reason that these circumstances would not normally occur — and in any case can be easily avoided by moving a channel or so.

Construction

The unit is built in the type of case now normal for handhelds and seems adequately robust. The ergonomics are generally good and the keyboard has a light responsive feel. The volume and squelch controls are concentric with the lower knob having bar extensions. It fits well into the hand and the weight is reasonable. The supplied rubber duck aerial is better than several others which were tried on the rig for comparison purposes. Battery packs are easily changed and are locked to the rig with a release button.

Conclusions

This rig is substantially built, lives up to its specification and comes with a clear, well written manual. It is easy to use, has the facilities which most people would find useful, but has some infuriating points like the scanning system and the band switch.

As for price, it was originally advertised as a full spec. rig 'at the price of a thumbwheel rig' and at the original price it represented good value. Its cost has now been increased to £239, but at that price it has the superb FT-209 as a rival.

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

A CHANCE conversation at the club between another old-timer and your J. C. provides the lead — in to this piece. We were talking of old times, and the rigs we had then. On the receiver side, he started with a TRF, and reckoned the top-flight operators mostly used ever-simpler receivers, down to the one-valver with reaction, but taking endless pains to get this simple arrangement working to its best. The direct-conversion receiver was unheard of for most amateurs, though the principle was known in the early twenties; but since all telephony to be heard was AM, the DC receiver could only cope if the drift could be reduced by a very large margin.

On the transmit side, a few were using AM, but the majority used CW with a transmitter which, in the twenties, might be a self-excited oscillator straight into the aerial but by the thirties was probably crystal-controlled — you selected a nice frequency and sent off to the crystal firm for one of that frequency; and so of course for a reply to your CQ — you tuned the entire segment of the band, until you found someone calling you. Thus in the middle and later thirties much time and effort was going in to the development of better VFOs, so the transmitter could be laid zero-beat to the distant station and the contact conducted all on one frequency. There was much talk of the relative merits of this or that circuit, but J. C. never, ever, heard anyone point out that good construction was equally important!

The commercial communications receiver, one supposes, really came along in the mid-thirties and appeared on our scene almost at once. Eddystone was a big name in the way of components, and they brought a receiver out called the Eddystone ECR; then there came the famous National HRO, with its plug-in coil packs, separate PSUs for DC or various AC supplies, and bandspread on the amateur bands. Above all it had a crystal filter at the 455 kHz IF. It was this latter, developed by various people and written up in *QST* by Lamb initially, complete with a practical circuit, that sounded the death-knell for the TRF receiver. By 1939 there were superhet receivers with crystal gate available from National,

RCA, Hammarlund, Hallicrafters, and in this country Eddystone; but the services in some cases went to war in 1939 with TRF receivers.

War saw all these receivers turned out in their thousands, and some spectacular improvements in technology, driven by the need to go ever higher in frequency. Luckily for us, we had the first ever high-definition TV service, on 45 MHz, and time to realise the shortcomings of the valves we had in the TVs. In three short years we had high-power radar on 3 GHz and work going on at 10 GHz. Usable HF and VHF rigs were operational; and at the end of the war a large proportion found its way into amateur shacks. When an AR88D could be picked up for a few pounds and a one-band 25-watt rig built for next to nothing using an 807 — 807s were in the shops at five bob! — then amateur radio was entering its golden age. CW reigned supreme, but the Phone bands were pure cacophony with carrier heterodynes everywhere; bad operating was mainly — as today — on the Phone bands, and anyone who had made the first base of DXCC and got 100 countries confirmed on Phone was a superb operator and had cast-iron ears!

SSB had been tried back in the thirties but around 1952 a small group were demonstrating it to be practical on our bands, and writing about it. They killed home-brew (until then everybody built their own rig and most had a surplus receiver) by over-stating the difficulties of setting-up an SSB transmitter — completely forgetting how almost everybody had built a superhet receiver, which was the same animal turned back-to-front . . . but the pro's hadn't forgotten, and Collins brought out the first SSB transceiver and set the trend we are still on to this very day. All we have seen since is the change to solid-state and the rise of digital circuitry which have given us phase-lock loop VFOs, smaller boxes, and digital readout. But make no mistake, those old rigs were as effective at spanning the world as any of today's; indeed the first all-continent hook-up on our bands was as early as 1930, with the late G5PP, Bob Palmer, representing Europe.

The Mail

R. E. Freeman (Sunderland) first; Richard is 79 and has just passed his RAE; at the time of writing he was waiting for his call. Meantime, Richard would like to hear from anyone with data on the conversion of the Pye W15AM, and information can be sent to him at 22 St. Aldate's Court, Grindon, Sunderland SR4 9LT.

H. M. Graham (Chesham) noted his first /AM station for a long time, in the shape of KD0MR/AM, saying he was about to land; by the signal strength on 14 MHz this was most likely at Heathrow. Maurice repeats his question about the IK prefix; usually the second letter in an Italian prefix refers to a group of offshore islands, in a similar manner to our GU and GJ, but Maurice has noted IKs in all the numeric prefix areas. Anyone any ideas on this one?

Turning to *B. Patchett (Sheffield)* we find yet another interested in the idea of an SWL listing; Brian has been an SWL for years, and more recently of course taken out G4VBP, so he sees both sides of the coin. This has led him to his current interest which is in learning a few words of lots of languages for a listing which he can use when working overseas stations. Dutch is the top of the list at the moment, with Japanese next. On a different topic, Brian says he has never run across another SWL in Sheffield and that, considering the large VHF population of the area, the local two-metre activity is like Top Band — not much! Thus, he concludes, there must be lots of two-metre rigs gathering dust; and he's probably right at that.

G3KPO next — he of the Wireless Museum on the Isle of Wight. Doug says that if any BC SWLs hear his dulcet tones on the 39 and 43 metre bands (6860 and 7590 kHz) they will be listening to Radio Peking. . . . Doug was invited to make a tape there during his recent visit to that country in which he extolled the Isle of Wight, and wished success to the Chinese radio amateurs.

We turn now to *F. Dunn (Chester)* who reckons the bands are in the doldrums, but has been lucky on occasion by being 'on parade' when the 21 MHz band has opened up. Frank has had some pleasant surprises too on Eighty, but reckons that for Top Band and Eighty a better aerial is an urgent need. An odd call noted on Eighty CW was the chap signing DL/KA9TGQ/AE — just what does the /AE suffix mean? Your J.C. has to admit he doesn't know, but he is prepared to bet it isn't an 'official' suffix.

Like virtually everyone else, *N. Henbrey (Northiam)* is in favour of the SWL directory idea . . . looks as though we have some work to do! Norman also adds a few to both his All-Time Phone total and the RTTY score.

Now to *Mrs. R. Smith (Nuneaton)* and here we have to delete one prefix . . . because we can't read it! There would seem to have been a bump in the surface on which Ruth was writing, and the result looks like 406K . . . which we know it isn't; Ruth doesn't make those sort of errors!

Now *L. Marquardt (Hereford)* who mentions that the IQ8RAI was a 'special-event' station, noted on December 12.

G. Caselton (Orpington) has been somewhat short on time of late, and so he has a short list and a note to say a complete up-date next time.

HPX Listings, 1985

This issue is of course the last appearance of the 1985 Table, as we now have the final scores to hand. For 1986 we

ANNUAL HPX LADDER Starting date, January 1, 1985

SWL	PREFIXES	SWL	PREFIXES
D. Pye (London W2)	430	T. Ross (Edinburgh)	232
L. Marquardt (Hereford)	360	W. J. Prior (Lochcarron)	213
M. Probert (Basingstoke)	288		

This is the final appearance of the 1985 Table. For the next issue, the starting date is January 1, 1986; minimum of 200 Prefixes to have been heard for an entry to be made, in accordance with HPX Rules—see p. 29 this issue. At score 500, transfer to the All-Time ladder is automatic.

HPX LADDER (All Time Post War)

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY			
B. Hughes (Harvington)	3104	J. J. Sales (Lancaster)	697
E. M. Gauci (Malta)	2756	G. Caselton (Orpington)	730
Mrs. R. Smith (Nuneaton)	2533	A. Vest (Durham)	580
E. W. Robinson (Felixstowe)	2448	I. Thomson (Rye)	564
H. M. Graham (Chesham)	1850	N. Fox (Wakefield)	561
M. Rodgers (Harwood)	1596	S. Wilson (St. Andrews)	538
N. Henbrey (Northiam)	297	C. Burrells (Stevenage)	506
S. Baker (Cwmbran)	1527	J. Singleton (Withernsea)	506
N. Henbrey (Northiam)	1418	Mrs. T. Carmichael (Lincoln)	502
N. E. Jennings (Rye)	1406		
N. Askew (Coventry)	1367	CW ONLY	
F. Dunn (Chester)	1366	F. Dunn (Chester)	1788
R. Fox (Northampton)	1305	J. Goodrick (I.o.W.)	1763
G. Shipton (Rye)	1091	A. Vest (Durham)	746
G. A. Carmichael (Lincoln)	1077		
M. Ribton (Gillingham)	1050	RTTY ONLY	
J. Routledge (Hartlepool)	988	N. E. Jennings (Rye)	668
M. Hudson (Folkestone)	987	P. Lincoln (Aldershot)	530
P. Lincoln (Aldershot)	888	J. Routledge (Hartlepool)	342
B. Patchett (Sheffield 9)	847	W. J. Prior (Lochcarron)	327
J. Heath (St. Ives, Cambs.)	788	N. Henbrey (Northiam)	297
R. Wooden (Staines)	761	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—see p. 29, this issue.

propose to make a small change. The Rules will be the same, except that there will be no upper limit to the 1986 Table. We will still translate you at 500 into the ATPW list, but keep you also in the 1986 Table; thus, at the end of the year we will see who has heard the most prefixes in a year. And, if the result in this sunspot-minimum year is good enough, we might even find a small prize!

Circuits

Lots of you talk about the little devices you have knocked-up to go with the stations: ATU's, aerials, audio filters, and all sorts. If they are successful, send us a circuit and a short description plus, if possible, a colour or (preferably) black-and-white print, nice and sharp. Don't worry about the text — your old J.C. will lick it into shape if necessary — and we will present it along with an "SWL" piece. All contributions will be acknowledged, and each used will of course be credited to the originator.

Back now to our letters. *P. Oliver (Paisley)* was still recovering from the New Year holiday and getting back into gear — but he did manage a few more in the Ladder score. Every year, your J.C. wonders why we do it, over-eating (and drinking!) for no significant reason. After all, Christmas is a religious festival really, and the New Year is an artificial division — neither longest nor shortest day nor at an equinox. Odd creatures, aren't we? (Miserable old so-and-so! — Ed.)

On the subject of the SWL listings, *B.F. Hughes (Harvington)* is also in favour but he suggests that, rather than publish in these pages, we turn it into a list available for the price of return postage and a little for the costs. This seems to us to be a better way but there is a snag, which applies whichever way the listing is done: how do we be sure everyone on the list is currently *correctly* noted? It could be that someone who loses interest, or gives up, or changes address, may not bother to tell us, or will just forget.

For *M. Hudson (Canterbury)* the score is rapidly getting to the magic thousand, with some rare ones in the list; one we noted was VR6JR on Pitcairn, heard at about the right time on Eighty. Mick seems to spread his listening out well too, to make the most of the 'useful' times.

An old friend of this column is *M.G. Toms (Rayleigh)* who keeps us posted as to what goes on at the Barking club. The VHF contest on March 6, 1300 — 1700 GMT, run by that club will have an SWL section, but it depends on the degree of support by SWLs as to whether it is to go on after 1986. Write for the full details to Mike at 32 Wellington Road, Rayleigh, Essex, and give the contest your support.

HPX RULES

- (1) The object is to hear and log as many *prefixes* as possible; a prefix can only count once for any list, whatever band it is heard on.
- (2) The /M and /MM suffixes create a new series: thus G3SWM, G3SWM/M and G3SWM/MM all count as prefixes, and where it is known to be legal, /AM also.
- (3) Where a suffix determines a *location* the suffix shall be the deciding factor, thus W1ZZZ/W4 counts as W4. Where the suffix has no number attached, e.g. VE1AED/P/SU, VE3UJ/P/SU, they are arbitrarily counted as SU1 and SU2 respectively, and the same holds good for similar call signs.
- (4) When the prefix is changed both the old and the new may be counted; thus VQ4 and 5Z4 both count.
- (5) The object is to hear *prefixes* not countries, thus there is no discrimination between say MP4B and MP4K which count as one prefix.
- (6) Only calls issued for Amateur Radio operation may be included. Undercover and pirate call signs will not be credited, nor any MARS stations be claimed.
- (7) G2, G3, G4, etc., all count separately, as do GW2, GW3, GW4, etc., and in the same way K2, W2, WA2, all count separately even though they may be in the same street.
- (8) Send your HPX list, in alphabetical and numerical order showing the total claimed score. With subsequent lists, it is sufficient to quote the last claimed score, the new list of prefixes, and the new total. Give your name and address on each sheet, and send to "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts., AL6 9EQ, if possible to arrive before SWL deadline for that particular month.
- (9) Failure to report for two consecutive listings, i.e. four months, will result in deletion from the Table, although there is no objection to a "Nil" report to hold your place.
- (10) Starting score 200. Phone Table is mixed AM/SSB, with a separate CW Table. No mixed Phone/CW Table, nor will AM-only or SSB-only entries be accepted.
- (11) List will be based on those shown in the current "Radio Amateur Prefix-Country-Zone List", published by Geoff. Watts (see Advertisers' Index in any issue of SHORT WAVE MAGAZINE).

It is a good thing to comb-out the HPX list you enter once in a while, as errors always creep in. A. Vest (*Durham*) has done just that, and found the odd duplicated prefix. Thus his current listing is entered after the new prefixes have been added and the 'dupes' subtracted.

S. Wilson (*St. Andrews*) is now all rigged up at the new QTH, and sends a first entry for 1986 — not as many as he would have liked but the demands of his work over Christmas have kept him away from the receivers. Now it has all got back to normal, SWL Wilson hopes to get a few hours of spare time which can be spent listening.

A.P. Lincoln (*Aldershot*) divides his time between programming and amateur radio; his latest, for the Sharp MZ80K or MZ700, is a machine-code version of the HPX program, and also a CQ list program for which the data was largely from N. Jennings. The only snag about all this is that it reduces time available for SWL-ing. Incidentally, Peter says that if anyone wants a copy of this one he will be happy to help, provided he gets a blank tape. Contact him on (0252) 317870.

J.J. Sales (*Lancaster*) was trying his FT-200, into a dummy load of home construction; the dummy load wasn't working and the resulting mismatch did the '200 a mischief. The moral of this little story is simple — *always* check it out fully before you put it into operation. In this case, too, it would have been a good scheme to

inject low power into the dummy load before going straight to full output, and then going up in steps, at least for the first time. Your J.C. checks all his station gear too, at regular intervals. The sort of thing is a mechanical check of all external connections to the box, followed by a check of operation both on receive and transmit.

The VK2ABQ beam of W.J. Prior (*Lochcarron*) succumbed to the winter gales for the third time in a year — the inevitable result of living on the west coast of Scotland. There isn't much to do about it; the beefing-up of the system only makes it stay up until the salt atmosphere corrodes it — and then it either makes electrolytic noises or falls down! However, things can be improved if one takes care as to which metals are used for construction, and avoids the use of differing metals as laid down in the Corrosion Table, when connections are to be made; for example copper wire elements should be fixed by aluminium or zinc or cadmium plated bolts — *provided* you don't damage the plating during construction! The corrosion due to dissimilar metals is always accompanied by noise if any movement is involved, and of course this is precisely the case where our skywires make their bow.

E.M. Gauci (*Sliema, Malta*) has quite a long list on offer, but it is mostly — apart from the odd American — of first-hop stuff from Malta, covering Europe, Northern Africa and the Middle East. As Eddie says, this darned quiet sun year is a bit of a nuisance!

E.W. Robinson (*Felixstowe*) has made his peace with the bands while conditions are so poor, and turned to a couple of construction projects. The first one was an ATU and then a fun thing in the form of a crystal set. This has been quite interesting; Ted can receive Hilversum, BBC World Service, and Caroline, but BBC4 is rather weak — rather as one would expect with the Robinson seaside location. To your J.C. the fascinating part is the historical difference: if one looks in books of the early days the crystal set was reckoned to be only useful up to about five miles from the transmitter for broadcast programmes. Indeed, this was reckoned to be the range of a TRF TV set from Alexandra Palace's first transmitter, in both cases despite the transmitter power involved.

So — that's yer lot, gang, for another time, at least as far as the mail goes. Don't forget the HPX entries for next time, and the slightly changed arrangements already mentioned. Those who already have an entry in the ATPW won't be barred; and since we intend to run in this fashion at least until the next sunspot peak is past, the results will record a relationship between sunspot number and the level of DX there is about — and that isn't a relationship that has yet been formally plotted.

Experimental Radio

In those early years — say, up to around the fifties — most amateurs were experimentally minded, and of course the need to home-brew most of the station meant that the experimental techniques were kept alive. However, the really interesting data is that locked-up in amateur radio station logbooks, since by the nature of things amateurs appear on the earth's surface in a more or less random fashion and operate at more or less random times. How sad it is, then, to find any relaxation of log-keeping, either in terms of the licence or practice. In real terms, those logs could unlock the secrets of the mystic 'good location' and just about everything as far as propagation is concerned; indeed they have already provided enough data for amateurs to accept the 'grey-line propagation' idea, and to show beyond all doubt that the conventional idea of ionospheric propagation just won't do.

Finale

That's it for another time. Send in your entries for the Ladders, your entry for the circuits section, and your details for publication in the SWL address listings; we will tabulate those we already have, and with the next lot have the makings of a decent 'contact list' for you all. Deadline is **March 20th**, and address your letters, as always, to J.C., "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meanwhile, all the best!

Infinitely Variable Polarisation Devices for 'Oscar' Operating

N. C. G. GUILFORD, MA (Cantab), G8SMQ

THE need for a means of transmitting and receiving radio waves, the polarisation of which can be varied at will from 0° through 360°, becomes very apparent when operating Oscar-10 on a regular basis. Polarisation changes have been monitored by the author almost daily since the switch-on of the beacons and of the transponders in 1983, and they often show differences in effective signal strength of up to 20dB between best and worst at any one time. Factors affecting polarisation should be the subject of a separate article, but they include (a) the position of the operator's station on the earth's surface, (b) the instantaneous attitude of the satellite's antennas with respect to that station, (c) the configuration of those antennas, and (d) Faraday rotation — to mention but four.

The following describes a cheap, simple and efficient method of making polarisation devices (using readily obtainable materials) for any frequency, that will handle any power that the amateur is likely to use on transmit, and that have a negligible insertion loss on receive. It is based, quite simply, on varying the relative delay length (from zero to a full wave) between the two feed lines from the transmitter or receiver to two Yagi antennas, mounted concentrically at right-angles; thus resulting in infinitely variable phase control between the two wave components.

Phasing Control Arrangement

As shown schematically in Fig. 1, the Rx/Tx is connected via 50-ohm co-axial cable to a slider, which is arranged to contact any point on a 100-ohm impedance line of length just more than half a wave. The ends of this centre section continue through two

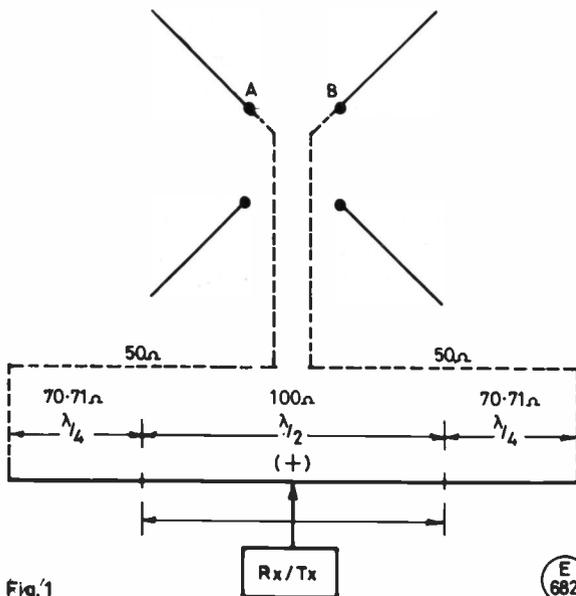


Fig. 1

Fig. 1 Schematic diagram of the polarisation phaser system, connected to cross-Yagi elements, mounted at 45 and 135°. The feed lines, A and B, need not be equal.

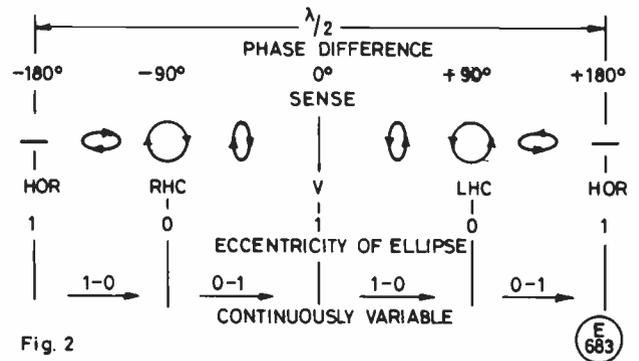


Fig. 2

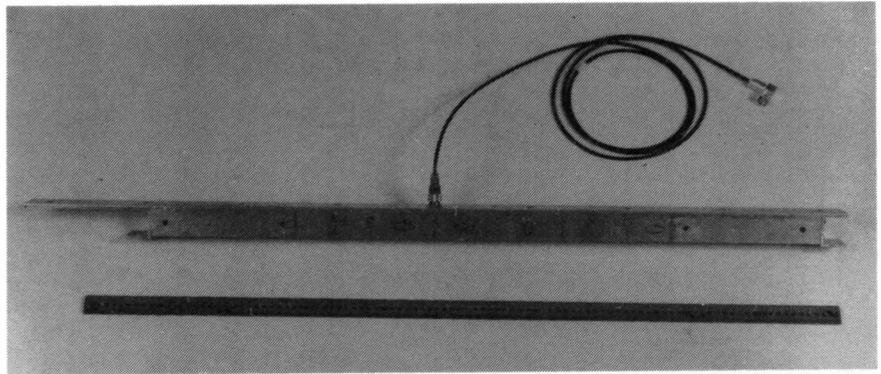
Fig. 2. Calibration of the contact position on the centre half-wave section, when the electrical centre co-incides with the physical centre of the phaser. Every position of the contact can be thought of as giving elliptical polarisation, the eccentricity varies with phase angle — from unity at phase 0° (vertical linear), and unity at phase plus/minus 180° (horizontal linear), through to zero at phases plus/minus 90° (left/right circular). The negative phases produce clockwise rotation, and the positive phases produce anticlockwise rotation. The position of 0° phase can be adjusted to anywhere along the phaser by merely adjusting the length of one of the feed lines, A or B, in Fig. 1. The elements on the antenna are usually displaced fore and aft, and this relative displacement will affect the position of zero phase on the phaser scale.

quarter-wave transformer sections of 70.71 ohm impedance, which connect through any reasonable lengths of 50-ohm co-axial cable to the 45° and 135° elements (A and B) of any suitable cross-Yagi antenna system. Thus, by moving the position of the slider, the operator can choose the phase difference between the two components of the incoming or outgoing wave from zero through to 360°. Fig. 2 shows the polarisations resulting from this movement, for a phaser with its physical centre arranged to coincide with the electrical centre of the system. It is interesting to note how the polarisation sense flips from right-hand elliptical to left-hand elliptical as the slider phase position goes from minus to plus through zero (vertical linear), and back again through 180° (horizontal linear); and also to note how the major axis of the ellipse flips between horizontal and vertical as the phase position passes through 90° markers (at right and left-hand circular positions — i.e. zero eccentricity).

Construction

Fig. 3 shows the completed unit for 70cm. All items are exactly the same in construction for any other frequency, except the lengths to which the sliding lid, the transformers, and the central section are cut. These lengths will, of course, conform in principle to Fig. 1 for the frequency bands needed. The two quarter-wave transformers could consist of suitable impedance co-axial cable, which would reduce the total length of material. But it is neater, more accurate, and more efficient to incorporate them into the unit, as described.

Fig. 3. The 70cm. version of the polarisation phaser, completed and calibrated for the author's antenna and line configuration. The cable connects to the Tx/Rx. The two sockets for the antenna connections are on the further side of the picture. The metre rule is for size comparisons



As can be seen in Figs. 4 and 5, the unit is based on $1\frac{1}{2}$ " square aluminium stock channel, of wall thickness $\frac{1}{8}$ ". The sliding lid is made of $1\frac{1}{4}$ " \times $\frac{1}{8}$ " aluminium stock screwed to $1\frac{1}{2}$ " \times $\frac{1}{8}$ " aluminium stock as shown in Fig. 3. Upon assembly, this forms a sliding-lidded box section of $1\frac{1}{4}$ " square internal dimension. Calculated from the standard impedance formula, a central conductor of $\frac{1}{2}$ " \times $\frac{1}{16}$ " results in an impedance of the required 100 ohms. This conductor is cut from stock brass strip, which is then silver-plated or nickel-plated for low slider-contact resistance.

The two transformers, as shown in the end view (Fig. 5), are obtained by inserting quarter-wave cut lengths of aluminium stock bar 1 " \times $\frac{1}{4}$ " to give a centrally aligned box-section of internal dimension $\frac{3}{4}$ " square. Carrying the $\frac{1}{2}$ " \times $\frac{1}{16}$ " plated strip through the centre of this box provides the impedance of 71 ohms as required. Eight 1 " \times $\frac{1}{4}$ " bars are required for the two transformers (four each), each bar being fixed in position with two screws.

With the transformer bars assembled in the channel, a $\frac{3}{8}$ " diameter hole is drilled right through one side wall at each end of the unit, with the hole centre at $\frac{3}{8}$ " from the open end mid-way between top and bottom of the $\frac{3}{4}$ " square internal box. An 'N' type chassis socket is screwed into each hole, so that its earth face is flush with the inside of the box. The inner conductor of the 'N' socket is then carefully filed, so that the $\frac{1}{2}$ " \times $\frac{1}{16}$ " plated strip is supported centrally ready for soldering to it. Each end of the unit (see Fig. 5) is closed with a piece of angle (cut from excess channel), which also acts as a fixing lug for the unit. This angle is drilled and screwed to the end face so that, when assembled, the lid can slide over the transformer ends without hindrance.

The central conductor strip is supported by PTFE $\frac{3}{32}$ " sheet cut into spacers, as shown on the black background in Fig. 4. The

larger spacers (for the central section) are $1\frac{1}{8}$ " wide (push-fit) by about $\frac{1}{16}$ " high, and the smaller spacers (for the transformer sections) are $\frac{3}{4}$ " wide (push-fit) by about $\frac{1}{2}$ " high. Central troughs are then cut to $\frac{1}{2}$ " wide (push-fit) in the top edge of all spacers. The bottom of each trough is pared down with a sharp knife until the centre conductor strip is supported dead level and central to the transformer boxes and the channel-box section.

Since PTFE will not glue directly, small nicks are cut each side of the trough in each spacer, just level with the top of the supported conductor. Small blobs of Araldite are then cast into each nick, in order to wedge the conductor strip in position. Likewise, small fillets of Araldite are placed against the walls of the unit to wedge the spacers.

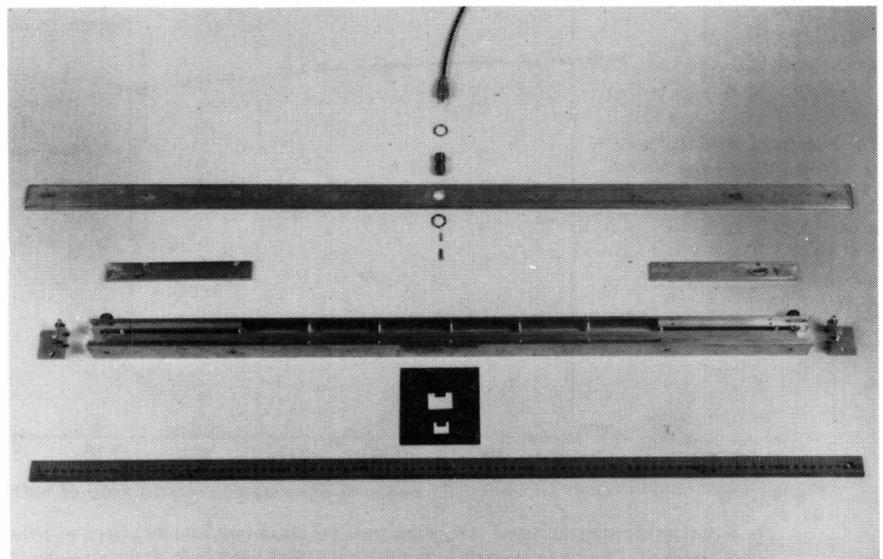
With the unit end-caps and the top transformer bars removed, the central conductor strip is then soft-soldered to each 'N' socket central conductor, as shown in Fig. 5. With the end-caps and transformer bars re-assembled, the body of the unit is complete, and can be bolted down in a convenient position in the shack.

A central hole $\frac{3}{8}$ " diameter is drilled in the lid assembly, and is thoroughly cleaned. This hole takes a standard VHF double male connector (ensure the connector has a through centre tube), which is held centrally through the lid by two ring-nuts. As shown in Fig. 4, the spring-loaded contact is a carefully cut and cleaned 1.5cm. length of centre conductor rod withdrawn from a standard PL259, and chosen to slide-fit the through-connector. About 1.25cm. of cigarette lighter spring, held in by the feed PL259 plug, which is screwed on the top-side of the through connector, completes the assembly.

Band Phasing Lengths

When cutting lengths for the 70cm. unit described, the centre frequency of the Oscar-10 uplink was taken as 435.080 MHz. The

Fig. 4. Partly dis-assembled view of the unit, showing the Tx/Rx cable with PL259, the (inverted) sliding lid assembly, with central $\frac{3}{8}$ " hole. The contact assembly, which passes centrally through this hole, is shown in exploded form, with its double connector, fixing ring-nuts, 'lighter' spring, and contact rod. Beneath this, is the main body of the unit, with the top transformer bars and end-caps removed — showing the full length of the central conductor strip, soldered each end to the 'N' sockets, and supported by five PTFE spacers in the centre section, and by two in each transformer section. The two styles of spacer are shown against a black background



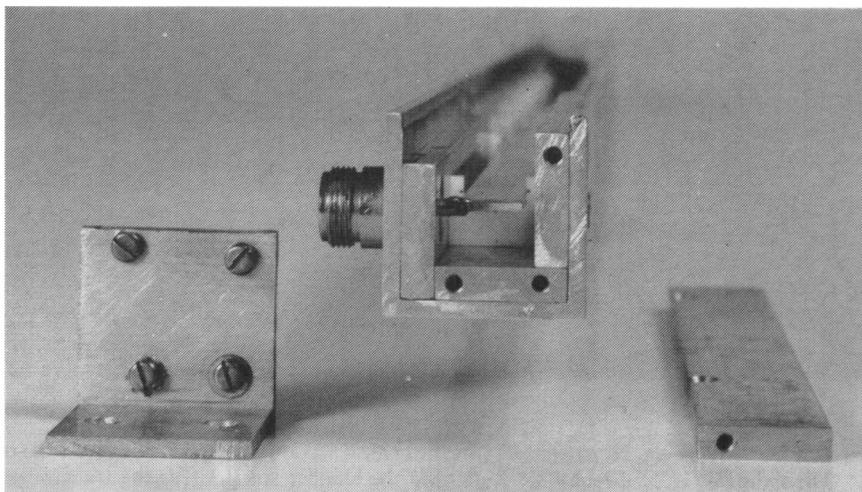


Fig. 5. Close-up of the end of the unit, with end-cap and top transformer bar removed. Shows the way that the 1" x 1/4" bars are fitted to give a 3/4" square internal dimension box. The top bar is fixed with two screws into the left-hand bar; the other three bars have two screws each through the channel walls. Also shows the central conductor strip, soldered flush to the 'N' socket centre contact. Note the two small nicks cut in the PTFE spacer, level with the top face: these nicks take blobs of Araldite, just large enough to adhere to the strip, and wedge in the nick

Hertzian formula then gives a full wave-length as 68.9cm; so the sliding contact should have a full travel of at least 34.45cm. (the author's allowance is 50cm. travel, to ensure adequate coverage). The effective transformer length must be 17.225cm; but, since each 'N' connector is set in by 5/8", the eight transformer bars must each be cut to 17.225cm. plus 5/8".

The corresponding 145 downlink centre frequency for Oscar-10 was taken as 145.920 MHz, giving a travel of at least 102.72cm. and an effective transformer length of 51.36cm. (again the bars were cut 5/8" longer for the end allowance). The 1269 MHz phasing units (for the 'L' transponder uplink) are scaled down in length accordingly, and any other band can be covered by simple Hertzian scaling, provided that the stock section sizes given above are adhered to. Having cut all lengths to tune at spot frequencies, it must be said that all phaser units are regularly used way outside these frequencies with no trouble at all. For example, the phaser cut to 435.080 MHz gives more than adequate performance from 430 through to 440 MHz. Moreover, the insertion loss is negligible..

The body of the 70cm. unit is less than one metre long, which should cause little inconvenience in mounting on a shelf or on wall brackets. Higher frequency units are, of course, still more compact. It may be felt that the 145 MHz unit, scaled up as above, appears to be an inconvenient length. In this case, the two end transformers can be replaced by two quarter-wave lengths of 72-ohm co-axial cable (the velocity factor of the cable being

applied when cutting). This reduces the body length to just over one metre. If necessary, this can be cut still further to just over half of one metre, by switching in or out an extra 50-ohm length in one 50-ohm feed line (either line A or B, see Fig. 1). This optional length should be one metre multiplied by the cable velocity factor. It has the effect of shifting the phase by 180°, and the control is thus exercised separately over each 180° sector.

Although it is preferred to make up separate phasing units to cover each band regularly in use, one universal 100-ohm slider unit could be made up, without transformers, for use with any reasonable frequency. Quarter-wave transformers would then have to be cut and connected in for any selected frequency band, and the relevant calibration marks clipped on accordingly.

Use of Polarisation Devices

It should be emphasised that no variable polarisation device, which is based only on varying the phase electrically, can completely match all the polarisation configurations involved in communication *via* Oscar-10 or, indeed, any other non-geostationary satellite. Taking earth vertical as a zero reference, electrically based phasers will give 0°, 90/270°, right-hand circular and left-hand circular (also 45° and 135° with the addition of RF switches). This coverage is equivalent to the six-position switch that many Oscar operators use. The extra given by the phasing units is infinitely variable eccentricity of elliptical

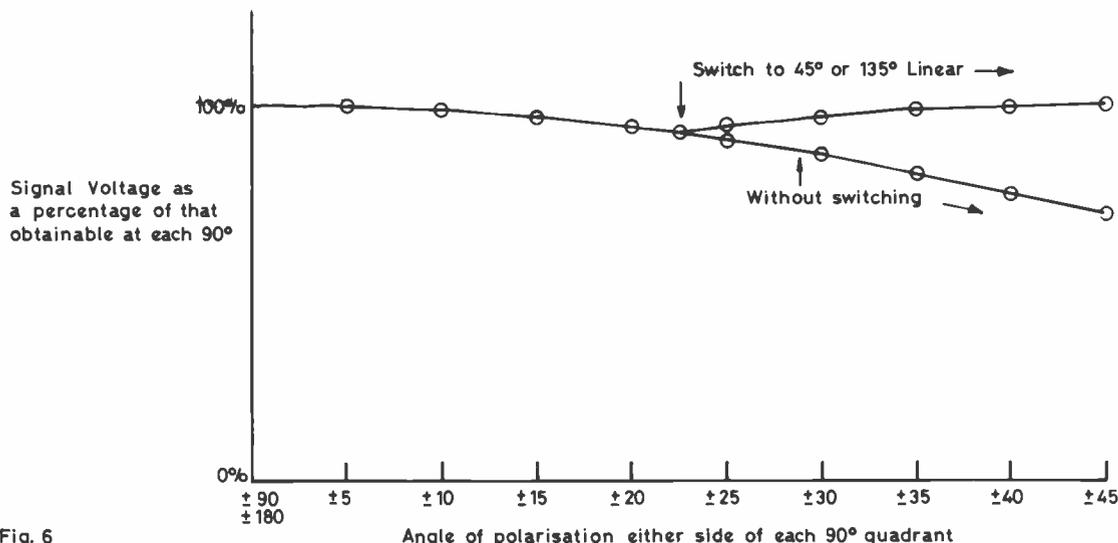


Fig. 6

Fig. 6. Graph showing the signal voltage dip from the maximum, and the effect, on reducing this dip, of switching in the 45 and 135° direct feed lines. This curve can only be levelled out completely by physically revolving the cross-Yagi system from 0° through to 45°

TIME ELAPSED FROM A.O.S. IN MINUTES	LEAST FADE CONDITIONS				WORST FADE CONDITIONS			
	SPIN PHASE DELAY ANGLE	ELLIPSE ECCENTRICITY	SENSE	SIGNAL TROUGH/ (Fade) PEAK	SPIN PHASE DELAY ANGLE	ELLIPSE ECCENTRICITY	SENSE	SIGNAL TROUGH/ (Fade) PEAK
2	-315	0.5	Left	7/8	-270	1.0	Left	4/9
6	-135	0.5	Right	7/8	-315	0.5	Left	3/7
12	-180	0.3	Right	7/8	-270	1.0	Left	3/7
31	-90	1.0	Right	4/6	-360	0.0	Linear	1.5/5
70	-90	1.0	Right	4/6	-360	0.0	Linear	2/5
95	-315	0.5	Left	4/6	-90	1.0	Right	2/5
111	-315	0.5	Left	4/6	-180	0.0	Linear	1/4
128	-330	0.3	Left	5/7	-135	0.5	Right	1/4

Fig. 7

Fig. 7. Best and worst polarisation figures, with resultant fade, for time intervals through a two hour section of one Oscar-10 orbit, taken at random, from two years of observations



polarisation of both left and right-hand rotation of the wave. It must be remembered, however, that all the elliptical configurations, resulting from use of the phasing units, both on transmit and receive, are produced on major axes of 0/180° and 90/270° (i.e. vertical and horizontal). Thus, in between the 45° markers there are slight dips in effective strength, as shown in Fig. 6. As can be seen from the graph, the maximum expected drop in signal voltage is about 29%. The dip can be considerably reduced by incorporating the switches to change to 45° or 135° linear polarisation at each 22½° sector, as indicated on the graph. Complete flattening of this curve can only be obtained by connecting the phasing unit to a cross-Yagi system which is arranged to be physically revolved through 45° about its radio-beam axis. Combination of the electrical phasing units, described above, with physical revolution control, for both links on Oscar-10, would be the ultimate for the purist operator.

Fig. 7 gives one short example, taken at random from the many hundreds of polarisation readings logged from Oscar-10 over its 2½ years of life, so far. The sharp changes in polarisation, sometimes exhibited, are principally caused by changes in the relative angle between the spacecraft's antenna configuration and the line of sight to the ground station. The spacecraft is star-fixed, but the line of sight moves quite rapidly, on some parts of the orbit. The three 70cm. dipoles, for example, are sited on a circle of the order of 1½ wave-lengths diameter, and any tilt from the normal produces inequality of radio path lengths. Even a few degrees change in this angle results in considerable alteration of the total relative delay/phase angles between the three, so causing average ellipticality of the effective signal polarisation. Moreover, to complicate matters further, the effective polarisation ellipses' major axis can either revolve at the spin-rate of the space-craft, or can introduce extra peaks in between the usual three per revolution. The latter has been borne out by observations, in which six equal peaks per revolution have appeared. Thus, the worst aspects of spin modulation cannot be corrected, under all conditions, by ground station efforts.

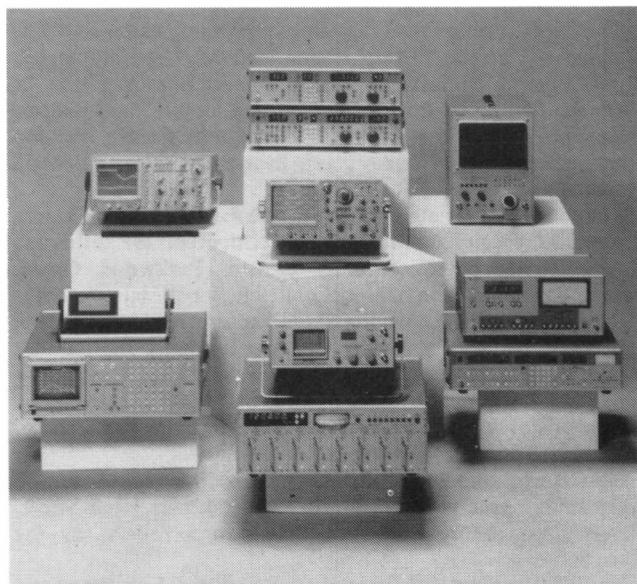
In practice, however, as can be seen from Fig. 7, the improvement from worst to best polarisation settings, at the ground station, can be very effective, not only in increasing the average signal strength, but also in reducing the spin modulation. Fast AGC was used to accentuate the spin-fade values in Fig. 7; slow AGC, of course, flattens these variations considerably, for working purposes.

In conclusion, when listening to one's own returned signal from Oscar-10 (which is, of course, the established, and preferred practice), one can adjust the timing of the spin peaks and troughs on transmit and receive independently, by means of the phaser units. So that, bizarre though it may seem, adjustments can often appear to cause the uplink peaks to fill-in the downlink troughs, so flattening out the spin-fade, without overall loss of signal — which is a persuasive argument for all Oscar-10 operators to use

variable phasing control for both uplink and downlink. Certainly, the use of polarisation control over the past two years or so (often showing, as it has, peaking-adjustments to result in 20dB, or more, improvement over right-hand circular) has provided overwhelming evidence of the inadequacy of the right-hand helical antenna for serious Oscar operating.

For the really purist operator, a combination of the electrical phasing units, described above, with controlled physical revolution, for both links, would be the ultimate.

When the 70cm. polarisation unit was constructed in August 1983, the total cost of all materials, as specified in this article (and all purchased new), was £11.73. This included all aluminium sections, stainless steel screws, brass strip and silver-plating thereof, all plugs and sockets, and PTFE sheet.



Fieldtech Heathrow Ltd. recently won the exclusive U.K. agency for Meguro electronic test equipment products. The range, part of which is shown here, includes oscilloscopes, signal generators, sweepscopes, sweep generators, audio oscillators, distortion meters, audio analyser, Q-meters, noise meters, logic analyser and RF millivolt meter. For more information contact Graham Holden, Fieldtech Heathrow Ltd., Huntavia House, 420 Bath Road, Longford, Middlesex UB7 0LL (01-897 6446)

CLUBS ROUNDUP

By "Club Secretary"

STRAIGHT in this time as we have a heavy mail and a shortage of time!

The Letters

Our first port of call is at **Abergavenny & Nevill Hall** where the locals are to be found at Pen-y-Fal Hospital, Abergavenny, in the room above Male Ward 2 every Thursday evening. This club is a registered RAE exam centre, and also we note that Bert, the Friendly Morse Man, attends for a period at each meeting.

Acton, Brentford & Chiswick foregather at Chiswick Town Hall on Tuesday, March 18, when they will have a demonstration of members' test equipment. The Hq is in Chiswick High Road, London W.4, and the start at 7.30 p.m.

March 3 is an evening of RSGB Technical Films, and March 8 a special-event, sign call GB4BLE, at **Basingstoke** Library Exhibition. Normal meetings such as the one we mentioned first are taken at Forest Ring Community Centre in Sycamore Way, Winklebury, on the first Monday of each month.

The "Englishcombe Inn," Englishcombe Lane, **Bath**, is the place the local gang head for; March 5 is down for 'Computers in Amateur Radio' and on 19th they have a natter night.

We believe the normal routine at **Biggin Hill** is a monthly gathering at St. Marks Church Hall, on the third Tuesday; as the last gathering was for the AGM, we don't have a firm programme, but note several very interesting suggestions. More details from the Hon. Sec.

The **Bishops Stortford** crowd has its formal meeting on the third Monday in the month at the British Legion club in Windhill. In addition they are nearly always represented on every Thursday evening in the saloon bar of the "Nags Head" pub on the A120 Dunmow Road leading out of the town to the east, towards the M11.

The new venue for the **Borehamwood** club is "The Wellington" at the Elstree station end of Theobald Street, Borehamwood, on the third Monday of each month.

On the first and third Monday of each month, the **Braintree** group is to be found at Braintree Community Centre, Victoria Street, unless a Bank Holiday gets in the way, as indeed it does on March 17.

March 20 is AGM night for the **Bredhurst** folk, and on March 22 there is the Rainham Mobile Rally; both events are at the club Hq at Parkwood Community Centre, Parkwood Green, Rainham. Talk-in is on S22, by GB4RRR, for the latter event.

Bristol City RSGB have the Small Lecture Theatre at Bristol University, University Walk, Clifton, normally on the last Monday of the month, unless that falls on a Bank Holiday, in which case it is brought forward. Thus on March 24 they have a talk by Bristol Weather Centre people — interesting to all, and of course handy for the VHF types.

Now **Bristol Shirehampton** where the routine is for a session every Friday evening at Twyford House, Lower High Street, Shirehampton. More programme details are to follow, says the Hon. Sec.

The **BT (Reading)** club foregathers at various BT premises, and you can get the details from the Hon. Sec. — see Panel.

A talk on Shelsley Walsh, where the hill-climbs are held, is the entertainment for **Bromsgrove A.R.S.** on March 11, and a normal club night occurs on 25th; both are at The Hundred House, Stourbridge Road, Bromsgrove.

On any Tuesday evening at the Mosses Community Centre in Cecil Street, you can find the **Bury** lads, although the main meeting is always the second one.

The **Cheltenham** club newsletter this month contains one of the most fascinating items we have seen for a long time — G6GR's description of the early years of TV in the twenties and thirties. The club, we note, has its base at Stanton Room, Charlton Kings Library, Cheltenham. March 7 is the constructors' night and on 21st they have a natter.

Chester is based at Chester Rugby Union Football Club, Hare Lane, Vicars Cross, where they are to be found on Tuesdays. Surplus equipment is on sale on 11th, and on 18th G3PYU talks about workshop practice. Finally on March 25, Norman Kendrick gives his famous talk on 'Japanese Morse.'

New Hq

The **Chichester** crew has moved to North Lodge Bar, County Hall, Chichester, and at the same time has made a slight alteration to meetings by having the first and third Tuesday in the month. On March 4 they have the Emergency Planning Communications Deputy Director along, and on March 18 the AGM. For details on how to get there, contact the Hon. Sec. — see Panel.

March 6 and 20 are the dates for **Colchester**, at the Colchester Institute, Sheepen Road. On the first date, John Nelson, G4FRX, and G4HMF combine to talk about RSGB, and on 20th Janet Gavin, the local crime prevention officer, will do the talking.

There are three 'potted talks' to occupy the **Cornish** members on March 6, in the Church Hall, Treleigh (on the old Redruth bypass); they also have the Annual Dinner at the Lowenac Hotel in Camborne on March 7.

Crawley is at Trinity Church Hall, Ifield, Crawley; but for the date we have to refer you to the Hon. Sec. — see Panel for his address.

Deadlines for "Clubs" for the next three months—

April issue — February 27th
 May issue — March 27th
 June issue — April 24th
 July issue — May 29th

Please be sure to note these dates!

'Some Aspects of Long-Distance Communications' is the title of the talk by G4CSB, to be given to the **Crystal Palace** group on Saturday, March 15, at All Saints Parish Rooms, at the junction of Beulah Hill and Church Road, Upper Norwood, London (opposite the IBA mast).

Every Wednesday the **Denby Dale** lads foregather in the Pie Hall; details of the events from the Hon. Sec. — see Panel.

Also on Wednesdays are the **Derby** sessions at 119 Green Lane; March 5 is a junk sale, and on 12th they have the AGM. No meeting on 19th, as many members are going to the Faraday Lecture, but on 26th they have a night-on-the-air.

The **Dudley** Hq is now the Allied Centre, Greenman Alley, off Tower Street, on second and fourth Mondays.

Edware has a talk on EMC by G8KLH on March 13, and on 27th there is an informal with some Morse practice. Find them at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edware.

The **Fareham** meetings are at Portchester Community Centre, Westlands Grove, Portchester, alternating informal natter sessions with talks. On March 12 they have an up-date on the new six-metre band, and on 26th a talk on amateur radio in France.

Wednesdays March 12 and 26 are the dates for **Farnborough** at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough, Hants.

Felixstowe meets in the back room of "The Feathers" pub, Walton High Street, Felixstowe, on March 10 for a talk on Halleys Comet by Paul Whiting, and on 24th they have their

Names and Addresses of Club Secretaries reporting in this issue:

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- TORBAY: B. Wall, G1EUA, 48 Pennyacre Road, Teignmouth, Devon TQ14 8LB.
- UK FM GROUP (Northern): J. P. Loughton, G4UNA, Claremont, Main Street, East Ardsley, Wakefield, Yorks. WF3 2AP.
- VALE OF WHITE HORSE: Mrs. J. Baker, G4SYL, 68 Wessex Road, Didcot, Oxon. OX11 8BP.
- VANGE: Mrs. D. Thompson, 10 Feering Road, Basildon, Essex.
- VERULAM: H. Clayton-Smith, G4JKS, 115 Marshalswick Lane, St. Albans, Herts. (St. Albans 59318)
- WACRAL: L. Colley, G3AGX, Micasa, 13 Ferry Road, Wawne, Nr. Hull, Yorks. HU7 5XU.
- WELWYN-HATFIELD: D. Fairbank, G0AII, 2 Sandpit Road, Welwyn Garden City, Herts. AL7 3TN.
- WIMBLEDON: G. E. Cripps, G3DWW, 115 Bushey Road, Raynes Park, London SW20 0JN. (01-540 2180)
- WISBECH: D. Wilkinson, G4KHF, 'Leon,' Lutton Gowts, Long Sutton, Spalding, Lincs. PE12 9LQ.
- WOLVERHAMPTON: K. Jenkinson, G1OIA, 10 Avondale Road, Wolverhampton, WV6 0AI.
- WORCESTER: D. Batchelor, G4RBD, 14 Oakleigh Heath, Hallow, Worcester. (Worcester 641733)
- WORKSOP: Mrs. C. Gee, G4ZUN, 100 Plantation Hill, Kilton, Worksop, Notts. (0909 486614)
- YEovil: E. H. Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW. (0935 75533)
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

AGM. They would like to thank the publican for his continued support.

A video of W5LFL's Shuttle trip is the programme on March 4 for Fylde, and on 18th they have an informal; both are at the Kite Club, Blackpool Airport.

For details of the Glenrothes meeting we have to refer you to the Hon. Sec. — see Panel. We believe their main meetings are monthly on a Sunday at Provosts Land, Leslie, Fife, and they are also there on Wednesdays.

“The Nags Head,” Charlestown Road, Glossop, is the Hq of

the **Glossop** club; usually Thursdays, but check with the Hon. Sec. as there are mentions of Tuesdays too!

If you are into low-power operating or simple home-brew equipment, the **G-QRP** Club is the one for you. Details from the Hon. Sec. — see Panel.

The **Grafton** chaps have moved from the Five Bells to *TS Wizard* close by Haringey Football Ground, White Hart Lane, London. Normally on second and fourth Fridays, but in March they will only be there on March 14 for a talk by Derek Aston, G8DR, on the 'Early Days'.

G4OO will be telling the **Greater Peterborough** chaps all about simple aerials on March 20, at Southfields Junior School, Stanground, Peterborough — and we recall he has written a book on this topic.

March 6 is down for a talk on satellite operation, and the computer buffs have their go on 13th; March 20 is a guest speaker. All these **Grimsbys** meetings are at Cromwell Social Club, in Cromwell Road.

Every Friday the **Harrow** gang heads for Harrow Arts Centre, High Road, Harrow Weald, usually in the Roxeth Room.

The easiest way to get into the **Hastings** club is to go to Ashdown Farm Community Centre on a Friday evening for the chat night. The main meeting is on March 19, and is the AGM; these main meetings are at West Hill Community Centre on the third Wednesday of the month.

Fairkytes Arts Centre, Billet Lane, Hornchurch, is the venue for the **Haivering** club meetings, and they are held every Wednesday evening. More details on the programme from the Hon. Sec. — see Panel.

At **Hereford**, the County Control, Civil Defence Hq, Gaol Street, is where it all happens. March 7 is down for a talk by John Morgan, G8OHH, and on 21st they have the informal chat night.

On the second and last Wednesday in each month, and indeed on most of the intermediate Wednesdays, the **Ipswich** crowd is to be found at the "Rose & Crown," 77 Norwich Road, at the junction with Bramford Road. The room is detached from the public bars, so juniors and newcomers are all welcome.

The new layout of the **I.R.T.S.** newsletter is very nice, and as this club combines the function of a local club with that of national society, where better to address any enquiries you may have on amateur radio clubs in Eire? The Hon. Sec.'s details are in the Panel.

March 4 and 18 are the dates for **Kidderminster** with the latter being set aside for G4MD to talk about 'Keeping it Clean' — the station signal, we presume! They get together at the Vice-Presidents' Club, Harriers Football Ground, Hoo Road, Kidderminster.

Northern Ireland now, and **Lagan Valley**, where the second Friday of the month is the routine, at Rathvarna Teachers Centre, Pond Park Road, Lisburn, Co. Antrim. March 14 sees them put on their Annual Hamfest at Grove Activity Centre, Knockmore, Lisburn, the talk-in channel being S22.

The **Lincoln** club Hon. Sec. writes to advise that they are still to be found at the City Engineers Club, Central Depot, Waterside South, every Wednesday. March 5 is an activity night, as is 19th. Various members get together to talk about space communications on March 12, and on 26th John Nelson, G4FRX, is there to talk about RSGB.

Up at **Lothians** they have a billet at Harwell House Hotel, Ettrick Road in Edinburgh, where newcomers are always welcomed; they foregather on second and fourth Wednesdays.

Lough Erne has its fifth Mobile Rally on April 13, at the Killmartin Hotel, near Enniskillen, with talk-in on S22 and SU8. Details from the Hon. Sec., who will doubtless be very pleased to give you details of the club activities too.

Hellaby Community Hall, Clifford Road, Hellaby is host to the **Maltby** group these days. In March they have activity nights on 7th and 28th; March 14 is a talk on test equipment and its use in the shack, and on 21st there is a junk sale.

For details and dates of the activity at **Maxwelltown** we suggest you contact the Hon. Sec. — see Panel. However, we can say that

their Hq is at the Tam o' Shanter Inn, Queensberry Street, Dumfries.

Nowadays the **Midland** group is based at Unit 3, Henstead House, Henstead Street, Birmingham B5 6HQ. On March 18 they have G4AAL to talk about 'Operation Raleigh'. Looking forward a bit, May 11 is the Drayton Manor Rally.

Morecambe Bay gets together every Monday evening at the canteen of the Luneside Engineering Company, Mill Lane, Halton, near Lancaster. Latest details from the Hon. Sec. — see Panel.

"The White Horse" in Fall Lane, East Ardsley, Wakefield, is the base of the **North Wakefield** crowd, every Thursday. March 6 is a talk on operating procedures at HF by G4RCC. On 13th they have a visit to Skelton Grange Power Station, and they will be at the Pontefract Rally on Sunday 16th. They join up with Pontefract again on 20th, to give a welcome to the arch-QRP'er himself, Rev. George Dobbs, G3RJV.

Every Thursday evening the **Nottingham** chaps are to be found at Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood. As to the programme, when they wrote, three of the four meetings were still awaiting confirmation of the speakers, so it seems pointless noting them; on the other hand, we know they always fill any gaps with something of interest. Contact the Hon. Sec. for the latest information.

Nice to hear from **Oldham** for the first time, and we note they are at Moorside Conservative Club, Ripponden Road, Moorside, Greater Manchester. More details from the Hon. Sec. — see Panel.

On March 7, **Plymouth** will be having a talk on Pye equipment modifications, and antennas, by D. L. Reeves, and on March 17 G3KJK will be talking about BT Goonhilly. Find them at Plymouth Albion Rugby Club, Beacon Park Road, Peverell, Plymouth.

Plymouth Poly club arranges its functions at rather short notice, but if you want the details contact the Hon. Sec. — see Panel for his details.

Our next stop is at **Pontefract** which means the Carleton Community Centre, Pontefract, where they are on the top floor; on March 16 they have the annual Components Fair, and on 20th — as already mentioned in connection with another club — they welcome Rev. George Dobbs, G3RJV, for his 'Home Construction' talk, for which they have booked the main hall. March 27 is the project evening. Summing up, we may say that the club is 'at home' on Thursdays for formal meetings, plus Mondays for informal nattering.

If you know of a blind radio amateur, then you could put him in touch with **QTI-TNA**; the group's main activity is that of reading items from radio magazines on to tape and then circulating the tapes to blind radio amateurs. Details from the office address given in the Secretaries' Panel.

Now we come to **RAIBC**, and here most people are aware of the group's interest, which is the blind and invalid radio amateur or SWL. These are the 'full' members, but many more are supporters or representatives, and clubs often help too. Again, details from the Hon. Sec. — see Panel.

Next we have **RAOTA**, the old-timers group; here the essential qualification for membership is the holding of an amateur radio licence, or an interest in the art, for twenty-five years. Once again, details from the Hon. Sec.

March 17's meeting for **Reigate** was still being set up at the time their newsletter was being written; however, we can at least direct you to the venue, the Constitutional and Conservative Club, Warwick Road, Redhill.

What about the **Royal Navy**? This group covers serving and retired RN types, plus MN, Reserve and even those in foreign navies. The regular newsletter is always of interest, and of course there are various get-togethers through the year. Details from the Hon. Sec. — see Panel.

The Thursday meetings at **Skelmersdale** continue at Beacon Park Centre, Dalton Lane. March 9 is activity night; March 16 computers in radio, 23rd project night, and on 30th there is a talk on QSL cards by G4ZAF.

Nice to hear again after a long gap from **South Birmingham**, still at its Hq at West Heath Community Association, Hamstead House, Fairfax Road, West Heath. The main meeting is on the first Wednesday evening and there are likely to be people in the club rooms on Mondays for an informal, Thursdays for HF night, and Friday for constructional activities. But nothing on Tuesdays!

Rooms 3 or 4, or both, are used on Wednesday evenings by the **South Bristol** group at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. March 5 is "GWR Locomotives in Steam" on films, by Ron Gardner, and on 12th they have a planning evening for their contest activity. ATV occupies March 19, and VHF on 26th.

The **South Cheshire** crowd has changed its Hq, to be at the BR LMR Sports Club, Goddard Street, Crewe, which gives them a ground floor room, suitable for the disabled. Get the March details from the Hon. Sec. — see Panel.

Southdown continues to have a date at Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne, this month's one being March 3 for a junk sale; they also are to be found at the Clubrooms at Hailsham — details from the Hon. Sec. at the address in the Panel.

It must be years since we last heard from **Southend**; nowadays they are to be found at Rocheway Centre, Rocheway, Rochford, Essex, every Friday — and of course their Rally is at the same venue, on June 1. Welcome back!

Yet another club to move is **Southgate**, where the new Hq is at Holy Trinity Church Hall, Green Lanes, Winchmore Hill, London, and they will be there on March 13 for a talk by G8NGF on TV and video techniques.

South Manchester continues to meet every Friday at Salemoor Community Centre, Norris Road, Sale. On March 7 they have a visit to Jodrell Bank, and on 14th G3USF talks about Aurora. On March 15 they have a 'Quad D/F Night', and on 21st an equipment bring-and-buy sale.

Stevenage has a receiver alignment session on March 4, and on 18th the AGM, both at Sitec Ltd, Ridgemoor Park, Telford Avenue; at 7.30 they have Morse, and the meeting proper starts at 8 p.m.

Stourbridge also has Morse at their meetings before the other activities. The first Monday each month is the main meeting and the informal is on the third Monday, both at Robin Woods Centre, School Street, Stourbridge.

The **Surrey** group is based at *TS Terra Nova*, 34 The Waldrons, South Croydon, on first and third Mondays; March 3 is a surplus equipment sale, and on April 7 there is the AGM.

Nearby **Sutton & Cheam** lives at Downs Tennis Club in Holland Avenue, Cheam; March 3 is informal in the bar, and on March 21 they have the Constructional Contest.

The **Thames Valley** venue is at Thames Ditton Library, Watts Road, where they are booked in for the first Tuesday of each month.

March 3 at **Todmorden** features G3PSM talking about IARU, and on 17th they have a talk on astronomy by Eric Lord. Both are at the Queen Hotel in Todmorden.

Torbay alternates Thursdays and Fridays at ECC Social Club, Ringslade Road, Highweek, Newton Abbot, and the monthly main meeting at the same place will be on Saturday, March 29 when the subject will be 'digital recording.' There is also the Dinner and Dance for which the odd ticket is still available from the Hon. Sec. — see Panel.

UK FM Group (Northern) meetings are on the first Sunday of each month, at 7.30 p.m. at the Royal Hotel, Barnsley. Thus the dates are March 2 and April 6.

The **Vale of White Horse** folk have the first and third Tuesdays booked at "The Waterwitch," Cockcroft Road, Didcot at 8 p.m. though members are to be found in the bar from 7.30 p.m.

Another Rally — this one is at **Vange**, and is at Nicholas School, Basildon, Essex, on September 7. Details on this and other club activities from the Hon. Sec. — see Panel for her details.

March 25 is the date for **Verulam's** G3PAO Memorial Lecture:

"Intermodulation, Phase Noise and Dynamic Range" is the title and the speaker G3RZP. Venue as ever is the R.A.F.A., New Kent Road, off Marlborough Road, St. Albans.

Now we come to **WACRAL**, the club for committed Christian radio amateurs and SWLs worldwide and here we notice that the members in SP-land are having serious problems; SP3ELD appears to have had his licence withdrawn by the authorities simply because of his membership. Details from the Hon. Sec. — see Panel.

At **Welwyn-Hatfield** they are based on Knightsfield Scout Hq, Welwyn Garden City, on first and third Mondays, with Morse classes on Thursdays. March 3 is G3BYG on dummy loads, while 17th is an informal.

Changes to the programme at **Wimbledon**: the surplus equipment sale goes back from March 7 to 14th, there is no meeting on March 28, and on April 25 they have G2FKZ himself to talk about propagation. Meet them at St. John's Ambulance Hq, 124 Kingston Road, Wimbledon.

St. George's Day get a celebration at **Wisbech** by way of an Award; GB0SGD, GB4SGD and GB6SGD will all be active between April 20 and May 17, and the qualifying QSOs are to be between these dates. For the nitty-gritty on this one contact the Hon. Sec., who will also be the one for details of the club — see Panel.

Tuesdays at **Wolverhampton** call up a visit to the Wolverhampton Electricity Sports and Social Club, Chapel Ash; March 4 is G8MWR on antennas and feeders, and on 11th the Decibel is explained. March 18 is a talk about RTTY, and on 25th they relax a bit with a night-on-the-air.

Nowadays, the Oddfellows Hall, New Street, is **Worcester** Hq. for formals and chat sessions, which are noted as March 3 and 19th respectively.

The **Workshop** programme for all 1986 is now nailed down; March 25 shows a session with the Sub-Aqua Club, where they have their Hq. for darts and dominoes.

The **Yeovil** members are at the Recreation Centre, Chilton Grove, Yeovil every Thursday evening. On March 13 G3MYM talks about FET circuits, and on 20th G3GC deals with modulation. March 27 is a natter, and on April 3, G3MYM will discuss J-notation.

Finally, **York** where we see G3WVO is Hon. Sec. once again; Keith tell us they are to be found every Friday at the United Services Club, 61 Micklegate, and already they are thinking of their 40th Anniversary celebrations in 1987.

QRT

That's it for another month, and the time has come to mention deadlines — they are in the 'box' in the body of the piece and are the dates for arrival of your letters, addressed to your "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

March Rallies

March 2, Welsh Amateur Radio Rally, Barry Leisure Centre, Holton Road, Barry, South Glamorgan, 11 a.m. to 5 p.m., talk-in on S22, trade and club stands, bring-and-buy, refreshments, licensed bar. **March 16, Pontefract 'Components Fair'**, Carleton Community Centre, Pontefract, 11 a.m. to 4.30 p.m., trade stands for the home constructor and D-I-Y enthusiast, G-QRP Club stand, bookstall, licensed bar, talk-in on S22. More information from Colin Mills, G0AAO, on 0977-43101. **March 23, Swansea Rally**, Patti Pavilion, Swansea, 10.30 a.m. to 5 p.m., trade stands, bring-and-buy, bookstall, licensed bar and full catering, talk-in on S22 via GB2SWR, free raffle. Details from Roger Williams, GW4HSH, QTHR (0639-815470 office, 0792-404422 home).

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Selling: Yaesu FT-102 all-mode HF transceiver, purchased May 1985, used few weeks only, £570.—Ring 0934-812865.

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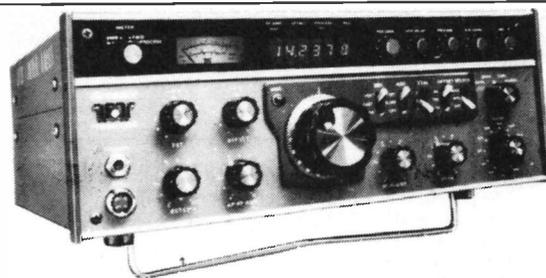
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