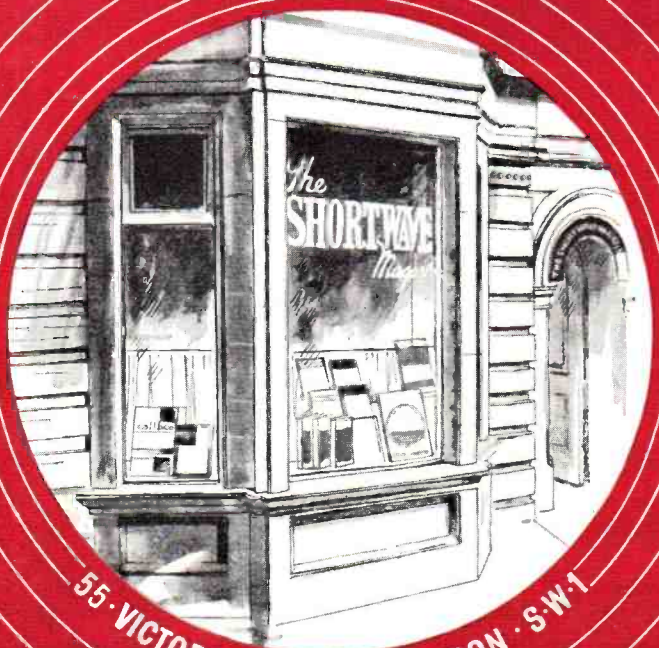
The SHORT WAVE Magazine

25p

VOL. XXIX JANUARY, 1972 NUMBER 11



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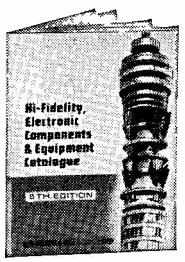

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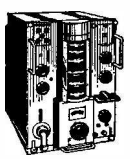

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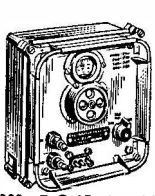

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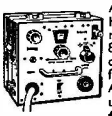

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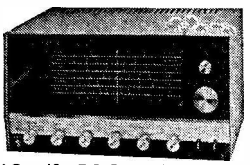

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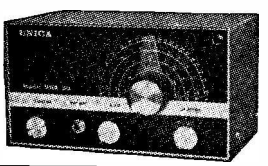

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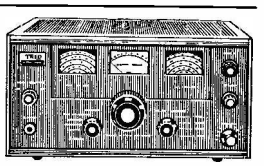

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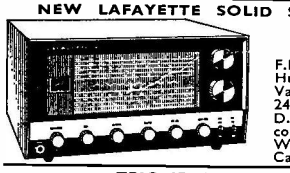

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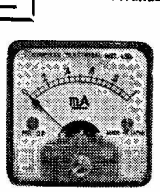

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INDEX

SHORT WAVE MAGAZINE

(GB3SWM)

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CONTENTS

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Staggering *Though the RSGB showed a deficit of £7,200 on its last year's working (five times that of the year before), there were only about 120 members present at their December AGM. Apparently, the accounts were passed almost without question—except that it was stated that the continuing loss for the current year, 1971-'72, is running at about the same rate, in spite of the subscription increase! Indeed, the figures suggest that this increase is only producing about an 8% improvement in gross revenue.*

Working steadily towards a general deficit situation—with no reasonable likelihood of those £20,000 of debentures ever being repaid—an Hq. staff costing £17,000+ in salaries for a membership of about 16,000—a production bill for the journal grossly inflated by reason of the fact that there is no proper balance between advertising revenue and the cost of printing and distribution—and a credit figure for "stock of publications" of nearly £18,000 taken in this time against only £12,000+ for the year before—one wonders what, for the RSGB, is going to happen next.

What, you may well ask, does all this mean, and anyway what business is it of ours? The answer to the second part of the question is that it is very important for Amateur Radio in the U.K., as well as for the membership of the Society itself, that the RSGB should be a well-managed, business-like organisation able to contend, financially as well as in the other ways pertaining to Amateur Radio, with the needs of the time. Since embarking upon the unfortunate Doughty Street venture, it is clear that the RSGB never has been viable.

The first part of our question, really meaning "What Should Be Done About It?", will be dealt with in this space on a later occasion.

* * * *

1972 *This issue will reach you as the year closes. In practically every direction in which one can see, the general outlook is sombre, unhappy or full of foreboding. But there is nothing either extraordinary or unique about that—it always has been so as every year changes!*

So there is no reason whatever why we should not wish you a Happy, Prosperous and Contented New Year—it could be!

Austin Forsyth, G6FO.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

FOR your old conductor, it is always a matter for surprise when another New Year comes up as a contributor to this august *Magazine*. It is a time, too, when it is a pleasure to recall all the friendships it has made possible—of DX-peditions planned, and accomplished, of friendly (and occasionally unfriendly) letters, leading to a wide correspondence outside the limited confines of CDXN—and to reflect that without all those correspondents there would have been no column in the sense in which it at present exists. To all, G3KFE offers, at this time of New Year, his best thanks and the promise that if he hears you, he will chase you for a QSO!

General Survey

This is always a bit difficult, insofar as somebody will report conditions "good" at a time another is, on the same band, finding things tough. Nonetheless, some trends can be noted. For instance, on November 29, 7 MHz was displaying something akin to what one might call an "electronic wet blanket effect" whereby your conductor could wander up the band and run across VK3MR, on CW, CR6, SVØWZZ, 9G1DY and UA9 on SSB, call them all to no avail, and be on the point of investigating the aerial system, when G3UML pops up, raises the SV, and remarks that he also was on the point of looking at his aerial—the relief in his voice very evident. As if this were not enough, one hears from G3XTJ of a similar experience on the same band at a slightly different time. You could add that Twenty has been dead on most evenings your conductor checked at a time when a few days earlier it had been producing the goods in no mean style. Even Eighty could sound like a sailor's idea of a winter's day—dark, dank and dirty.

And yet, every letter mentions working some DX or other—a proof that "conditions" are as much a state of mind as anything else—which is how it has always been.

Top Band

Lots to report this time, so let's get straight on. First, a letter direct from VS6DO, who says that most of his activities have been in the direction of W6 and W7. His *only* G contact at the time of his writing, November 26, had been with G3WRF on November 18. On four other occasions over the next week, a listen revealed DHJ at good strength but no sign of any U.K. signals. Paul is going to look out for us when he can, around 2230 to 2300z. His gear is an SP-600JX on the receive side, into an end-fed half-wave at about 180 feet up on a twelve-storey block. A TCS-12 supplies the ten watts of outgoing RF. As for frequencies, VS6DO says that, for him, the best spots seem to be 1804 kHz, or just one side or the other of DHJ.

It seems a long time since last we heard from GM3YOR (Kirkcaldy) who mentions lots of changes which have taken place since then. He now has a Vespa, a Sommerkamp FR-DX500 receiver and a K.W. trap dipole. SSB yielded DJ4SS, DKØWA, HB9CM, OH1VR, OH5SM and /A from the ATC hut produced CW QSO's with DK3BJ, DJ8WD, DJØYD, DLØII, DLØKF (at 1415z), DLØPG, HB9NL, OH1RG, OH2KK, OH3XZ, PAØINA, PE2EVO and W1HGT plus K2GNC from the Glenrothes Club Hq. after MCC.

G3VLX (Chislehurst) is still not fully operational from the new place, and he certainly misses his old Top Band vertical with comprehensive earthing system, which has yet to be reassembled. The result is that, while he can hear the W's (notably W1HGT, K1PBW, WA4SGF and W4EX) and best-bent-wire at present snaking round the garden is not yet man enough to raise them.

It's an ill wind that blows nobody good. G3ORP (Maidstone) has for long suffered an all-band "tearing" noise, which has now gone, thanks to a rewire job by the local Electricity Board and replacement of forty-year-old overloaded fittings. The improved noise level was the incentive for a couple of late-night sorties, and produced VE5XO, W2IU, W2EQS, W1WQC, W2UEZ, W4IKB all on the first occasion and then K1PBW, W3GM, W4YWX, WA4PXP, K4IXC, K2GNC and K2ANR on the second night's activity. Pretty nice for Top Band!

G3ZYY is still wandering the High Seas, and still listening on Top Band, with his ancient B.40 and 20ft. whip; nothing much had been heard since just before reaching St. Helena, but high hopes are held for the next stop, which we gather will be Singapore. The application for a Singapore ticket is "in the pipeline".

There's nothing like a Contest for stirring things up. The *CQ* WW-160 Contest will have started, at 2200z on Friday January 28, going on till 1500 on Sunday, January 30. CW only, two points for your own country, 5 for other countries, or 10 for W/VE/VO. Multiplier is one for each state of the U.S.. Province of Canada and DX country worked (Hawaii and Alaska counting as "DX countries" in this context). Final score is the sum of QSO points, times multiplier. Mailing deadline for logs is February 29, to "CQ 160 Contest," 14 Vanderventer Avenue, Port Washington, L.I., N.Y.11050, U.S.A. And may a U.K. operator win this time—they've been near enough in the past. In any event, we would be glad to have, for mention here, claimed scores for the Contest, whether sent in or not.

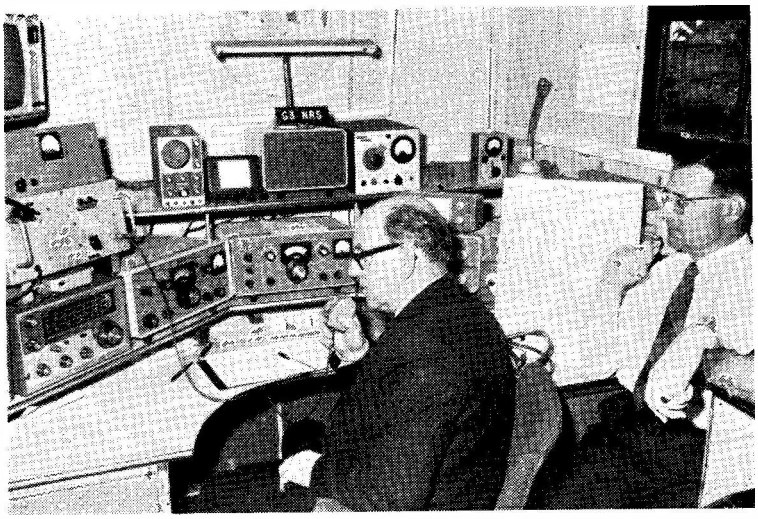
G3ZGC writes in from m.v. *Vianna*, GOSM, at sea, trading between the Persian Gulf and Brazil. We gather that on each trip, it has been possible to divide the voyage, Top Band-wise, into two parts—the first is between the Persian Gulf and South Africa, and in this area

about all one hears is an occasional beacon or carrier. However, once on to the second section, South Africa to Brazil, things start to liven up considerably. First, there is a ZS net around tea-time, all on AM. Off South Africa a number of strong carriers pop up, the frequencies corresponding to the European Coast stations and the Hifix beacon on 1·9 MHz is also very strong. Medium-wave broadcasters also show up, notably Luxembourg, but with very QSB signals. At the date of the letter came the first really interesting signal, when they were at 30°S. and 18°W., namely ZD8AY, 589 on 1828 kHz, and PY1DVG, who was heard calling EI8H and not getting a response.

If you are in need of HB9 or HBØ on Top Band, try between March 12 and 24, when the Cambridge University Wireless Society will be "on trip" over there. At the time of writing we do not know (and neither do they) just what the call will be.

A longer than usual letter this time from G2HKU (Sheppey), mainly concerns TVI problems, but nevertheless, it does mention a few QSO's, with Top Band CW producing DK1EB, DL1CF, DLØPG, OMØHI and PE2EVO, the latter as the only SSB contact.

The G3YMH report covers activity from more than one spot, and so we had better discuss it in terms of dates. First then, the *CQ* W-W Phone leg, when Ron was /A from Selwyn College, Cambridge. He raised PAØPN, PAØINA, DLØWW, DKØWA, DLØPG and DK2JX, with OE and OH audible on SSB, but not workable with the improvised aerial system he has at College. Operating from Staines, the main activity was working lots of G's, HB9NL, OK's, DJ3VC and OH8RC also being booked in. Again from Staines there was the CW leg of the *CQ* W-W Contest, which produced more EU activity than has been known in years. Some 24 OK's, ten DL's, OH1VR, OH1RG, OH3XZ, OH3NB, HB9NL, HB9QA, PE2EVO, PAØINA, GW's, GM's and GI's were Ron's portion over the two nights of operation, with DX as well in the shape of W1HGT and K1PBW. Also heard were W3GM, WB2NMI and W1BB/1, but the W's seemed keener on ZD8AY than the G's. At 0215 on a deadish band, KG4CS was weakly audible, but nothing whatever was heard of the proposed 4X4 activity—G3YMH wonders whether this was due to a snag at the 4X4 end, or just OM conditions.



Station of G3NRS, well-known member of the Scarborough Amateur Radio Society. He runs a very nice all-band layout, fitted into a console for tidiness and convenient operation. This is the sort of installation which is quite easy to fabricate, using hardboard, 1in. batten and a bit of imagination.

Lots of people have worked Sark this summer, thanks to GC3APA, who now reports from his home spot in Coventry on the activity. He stayed in Sark a couple of months longer than he had intended, and all operation was on Top Band, with QSL's sent direct whenever possible. At the time of his letter Ted had less than a couple of dozen cards outstanding to be dealt with—anyone short of a QSL can drop him a line at 48 Westhill Road, Coventry CV4-2AA. The last station worked was GM3HTH in Lerwick, Shetland; the most difficult ones, due apparently to skip conditions, were oddly enough the chaps south of London, although Ted comments bitterly on the tendency of the Southrons to call interminable CQ's without signing, declaring that many of these lids lost a GC Sark QSO as he tuned away. Incidentally, Ted finally got *his* Sark contact, with the GC3HZL crowd, who were operating from his QTH, over a distance of thirty feet for 599 reports! Because Ted was resident in Sark, he was either the first, or the first for a very long time, actually to appear in the listings as being on Sark, rather than as an expedition station; he even got into the census as a Sark resident!

Not for a long time have we heard from the G3SVK pen. Now Fred pops up from his London home QTH to report on his various doings. Seems he has worked Top Band CW with in all OH5SM, OH1VR, OH8RC, OH1RG, DLØYD, DL1PG, DL1CF, OE8MI, OL5ALY, OL1AOH, OK1HBR, OK1IFG, OK1JAX, OL6AOQ, OK1ATP, OL8ANL, OL4APE, PAØPN, GC2FMV (Jersey), HB9NL, HB9CM and PE2EVO, with the gotaway brigade including such as ZD8AY, W1HGT, W1BB/1, WA4EFX, VE1ZZ, K1PBW and VP2AAA.

G2DC (Ringwood) has been suffering from a touch of the screws in his right hand and wrist, of all things, which is rough on an ace CW devotee. However, Jack sticks at it, and this month found he could work just about everything on 160m. in Europe, although still he doesn't seem to be able to touch the real DX, to get himself up from the 20-countries mark at which he has been for so long. However, his CW still accounted for HB9NL,

lots of DL's, many OK's, OH1RG, OH3RY, PE2EVO and all the U.K. countries—so Jack still hasn't lost the knack of it.

The Tabular Matter

A vexed question, indeed. Lots of people want 'em but few will put in an entry! What we now propose is to take into account the fact that 1972 will be the *very last year* in which our present "counties" arrangement can stand, as so many will either disappear altogether or be so altered as to make the count completely different. So—starting on January 1, 1972, and continuing until the boundary changes come into force—try and work 'em all again from scratch. Score a point a county CW contact, a point for a Phone, and add the two for a cumulative total. We will show all the three scores in a new Table. Hence, the old Top Band Table goes, as does the Six-Bander.

Last appearance of the existing Tabular Matter will be next month. The new one will, if enough entries are sent in, be started in the following issues, although your conductor would like to have entries in good time to get the card-index going. If there aren't enough, then . . . enough said!

Eighty Metres

Faint heart ne'er won fair lady, 'tis said—but on this band one gets the impression that the metaphorical fair lady is knocked on the head and dragged away to a cave for eating. What between chaps who sit on any DX that does appear and whistle, and other chaps who sit on top of *them*, bleating about "this is my frequency" and other folk with tin-ears-and-ossified-opinions, not to mention the Angry Brigade generating electronic explosions, it takes more courage than G3KFE has to go on 80m. But some do, and they report, too.

The CW of G3DNF (Leeds) is still working its way to the end of the log-book; and Eighty helped along with UK9AAA, UA9CM, UL7JE, TF3SB, UQ2PN and VO1AW. Talking about CW, Frank Hattemore, G3WSH, writes in on other matters but permits himself a gripe about the maladjusted SSB rigs that operate in the CW segment of 3·5 MHz.

G2DC found conditions fair, when QRM permitted—he thinks most of it probably goes to bed and the 0300 to 0500 patch is probably the best time to tackle the band. He got CT3AS, OY5OB, UW9WL, UK9HAD, UL7BM, YV5AW, W1-5, W7-0 and ZL4IE. Another all-CW merchant on 80m. was G2HKU, who offers his catches as K2BZT, VE1AUE and UA9CM.

It is still, as indicated elsewhere, a rare event for G3VLX to be able to spend time on his hobby; so we trust 3AØFN and DJ6QT/P/CT3, both worked on SSB, were sensible of the honour thus conferred!

GM3OOK (Irvine) is rather dissatisfied with his QSL returns, not just on this band but on others too—he instances a case of a chappie who asked for the GM3OOK card—"Ur my first GM, OM, want u for award," an appeal which resulted in a QSL with IRC—which was replied to 18 months later *via* the Bureau! To turn to the matter of contacts, Jake stuck to his trusty CW steed, which hooked up with UH8CS, W1-4 and VE2BVY.

Forty Metres

Much of the trick here has been a matter of knowing how to drive one's receiver; as example, one evening G3KFE could hear virtually nothing of interest on 40m., either CW or phone. Winding up the AF gain to maximum, and turning down the RF gain till the receiver was almost dead got rid of the deafening noise of cross-modulation and tractor statistics from Peking, to reveal at good workable strength, in five

SIX-BAND DX TABLE

(All-Time Post War)

Station	Countries	28 MHz	21 MHz	14 MHz	7 MHz	3.5 MHz	1.8 MHz
G3DO	340	217	253	333	90	83	9
G3KMA	266	210	217	210	152	67	11
G3NOF	322	207	234	313	38	68	4
G2DC	339	182	312	330	171	116	20
W6AM	350	151	163	350	146	120	7
ZL3GQ	285	146	164	265	178	127	5
G3LZQ	265	140	156	215	72	38	8
G3IGW	212	129	153	169	136	107	50
G3PQF	175	119	53	107	85	56	13
9H1BL	202	117	129	143	74	57	8
G3YDX	164	115	101	97	91	92	17
G3RJB	180	84	63	169	60	37	8
G3IDG	131	77	97	56	29	18	12
G3DNF	141	71	100	103	45	37	2
GC3YIZ	92	54	24	41	21	9	2
G3XAP	122	44	75	53	77	31	13
G3DCS	139	32	84	95	36	36	11
G3VLX	76	10	26	38	27	36	19
G3ZEM	110	—	—	108	28	32	13

(Placings this month are based on the "28 MHz" column. Last appearance of this Table will be next month.)

minutes, SVØWZZ, CR6TP and 9G1DY, all around 7080 kHz, plus VK3MR and JA's at the CW end—*all were inaudible with the receiver at full RF gain and on AGC.*

G3XTJ (Palmers Green) in common with your G3KFE and others, noticed an "electronic wet blanket" apparently surrounding the U.K., letting DX in but no calling signals out! However, before this became too effective, Ed managed to hook CM3LN, CO6JH, CT2AC, CX1AA, HK7BDA, JX2HK, KV4CI, OD5GS, PJ9JT, PY1DDY, PY7ND, WB4RJK/TF, UAØPY, UAØUAM, UVØAB, UWØAF, UD6CN, UD6GDX, UF6CR, UG6AD, UJ8AB, UJ8JAS, UM8FM, UM8MAO, VE1-3, VE7BDJ, VK2EO, VK3XB, VK3MR, VP2AAP, G3LNS/VP9, W1-0, ZL1AH, 8P6DR, 9E3USA and 9Y4VU, all on the key except the TF contact.

Only two contacts on Forty are recorded during the period in G3DNF's log, but very welcome they were—HK7BDA and VA2UN, particularly, of course the first-mentioned.

Two particular periods have seen most of the 40m. operation from GM3JDR (Wick) namely 0800 to 0900, and 2130 to 2300. Taking first the early ones, we find CW with ZL1AYG, VK3OP, VK2BRK, VK7KB, OX5AS, VK2EO, ZL4AW, JA1UII, JA1NEC, JA1PPW, JA1OHV, JAØFQX, UI8LAC, UA9CBA, VP2AAA, VP2A, VK7CH, XE1DE, CM8RC, HI3PC, HK3AVK, UVØIP (Wrangel Is.) UAØKAF, VK3XB, UWØFP, W7JLU (st 1240z), YV5CEP, KG4EQ, KV4FZ and W1-Ø. The evening stints gave, by contrast, W5QNY/LX, UA9FBZ, JA6CLO, JA6ACZ, JA2CG, JA9BE, VE5EM, HBØXHV, UK9HAB, UL7HD, ZC4CB, VK3MR, 4Z4CC, WW2USA, VP9BK, HP1IE, UA9TS, VA2UN, JX2HK, HI8NCN, ET3USC, OY5NS, 5H3LV—while SSB evenings did for 4M1A, M1A, 4Z4HF, UK3R, 4NØDX, SVØWZZ and SV1SV. Among the morning SSB contacts one notices XE1DE, who was very pleased to work GM3JDR for his first European, on Forty SSB!

G2DC reports Forty as patchy and often ruined by the commercial RTTY, jammers and AM, especially during the morning; on several occasions the DX has been coming through quite well in the early evenings. For him, a new one for the band was VP5RF, others being HI3PC, JA1ARH, JA8FKH, KV4FZ, KV4CI, KH6RS, OY7FRA, PY4ABH, PY4AP, PY7SR, VK3OP, VK3FC, VK3KF, UA9XAL, UK9KAA, UVØIP (Wrangel Is.) and all W call areas.

For mobile working, G3HJK (B. J. Mitchell, 98 Queensway, Heald Green, Cheadle, Cheshire) runs an FT-277 transceiver. When this picture was taken, he was in QSO with OZ7BO (of auto-key fame) on Barnholm Is., the frequency being around 14250 kHz.

G3SVK has taken down his old "5RV" thing and put up in its place a K.W. trap dipole, which seems to be working a little better; efforts have been concentrated on 40m. CW (it is always on Forty that these antennae, like the 5RV and trap dipoles, work best.—*Ed.*) with such result as CM3LN, EA9EO, HK7BDA, KP4ADY, KV4CI, PJ2HT, PY1DVG, PY7BBX, PZ1AH, SVØWO, UAØABC, UJ8JAS, UH8CS, UL7GAC, VE's, VP2AAP, VP7CQ, W's, YV4BE, YV9CC, 4Z4GH, ZE2KV, VK3MR, UG6AD and KV4FZ. The heard-list is large—EP2DX, EL2CZ, HC2HM, HI8PAR, HC1KP, JA's, KG4CK, TA3ZA, W7GVA (Nevada), VP2ES, VU2JN, 6Y5XX, 9H1BM, PJ9JT and ZD3Q.

By contrast, G2HKU only offers three—IT1AGT, UL7AA and YV4GN, all worked on CW, which seems to have been the favourite mode for Ted's limited spare time.

All the talk about verticals has persuaded G3ORP (Maidstone) into trying one, and he is delighted with the results at all distances, day and night. He uses 2-inch tubing for the vertical and finds it loads quite successfully on both 14 and 21 MHz as well! As there is a second pole about the place, the next move is another vertical with phased feeding, as a QRM-eradicator. On a lighter note, G3ORP mentions that a good way to raise plenty of 597C-type LZ's (to whom he hasn't the heart to be unkind!) is to call "CQ USA"—it will *always* bring back at least three of 'em!

Just one for G3VLX—Deryck mentions WB4RJK/TF, which seems a fair catch on 40m. Sideband.

GM3YOR also tackled 40m. as part of his programme, raising such as UK9HAB, UWØAF and W2LXK. Drew is getting a bit suspicious about the number of "G3YOR" cards appearing in his Bureau envelopes, mainly for 14 MHz SSB which he has never worked; his one week as G3YOR/A was totally 7 MHz CW, and so anyone finding

the offender is requested to unmask him as loudly as possible.

JA1OHV, JH1EZZ, JA8FKH, JA9BE, JX2HK, KL7HCN, KL7HDM/VE8, K6QW, OX3ZO, PY7AZQ, YV4NB/MM and 9Y4VU all fell into the trap of GM3OOK, with his vertical and CW; Jake has some pertinent things to say in his letter about the comparison of HF ships' stuff and the equivalent shore (amateur) power levels. In general, the majority of ships have 400 watts, but Jake has been on many a one with less than 200 watts. Nary a one to be found with a kilowatt—and yet these are the stations who have to remain in contact come what may. There *must* be a moral for we amateurs to draw somewhere!

Collected Thoughts

First, to G3IDG (Basingstoke) who ponders the fact that just about every amateur-station photograph he sees shows great wads of commercial expensive-type gear; where *do* they get the boodle from for such things? Allan still runs his old 14-year-old Panda Cub, 1951 HRO, and aerial suspended from tottering masts, and classes this outfit with the CO-PA rigs, R.107 receivers and so on of years ago. Still, old rig or no, G3IDG now has his RAOTA certificate and is now looking forward to his next quarter-century on the air with as much keenness as he had when he started.

G3ZPF put his call on the letter this time, but forget to give his QTH—never mind, G3KFE makes it Dudley. David has been put off the air for a month by the GPO, with a case of TVI by AF stage rectification in the TV Rx, so the rental people can do something about it. The only periods he is allowed on is Saturdays till 1800, and Sundays in the morning—However, in spite of this pole-axing, G3ZPF goes up to 102 countries, by way of various efforts referred to elsewhere.

That picture, on p.597 of our December issue, of a ship installation of the 1930's brought back memories for G3WSH, who recalls that the Rx weighed about as much as a CR-100, but was in fact no more than an O-V-1, bandswitched on MF and LF, but with plug-in coils for HF; total coverage of the receiver was 20 to 20,000 metres. Sensitivity with those 2-volt valves came from reaction, and was, within its limitations, excellent.

Some years ago, the Grafton Radio Society brought out a certificate for working London Postal areas; since 1958, only fourteen WALT certificates have been awarded, which makes it a right tough nut to crack. You need 65 of the postal areas for the basic award, and stickers go on for increments of fifteen above this to the "possible" of 119. The rules have recently been revised and the certificate is an attractive one. So, if you want an interesting, target, get the rules and have a go at WALT—details from G3KEB, *QTHR*.

The recent silence from W4WFL/1 is explained—Morgan has moved into a new place at Farmington, Conn., where he has about an acre of land for aerials—so far, dipoles for 20 and 40m., with an 80-metre centre-fed Zepp and a quarter-wave end-fed for Top Band. The only snag is a BC station about half a mile away on 910 kHz, which rather takes out most of Top Band!

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
	Phone and CW	
G2DF	98	98
G3ADH	98	98
G3VLX	98	98
G2NJ	98	98
G2HKU	98	98
GI3WSS	97	98
GM3YOR	78	92
G3XWZ	76	90
G3KFE	72	88
G3YMH	69	93
G3LXD	64	83
	Phone only	
G2NJ	98	98
G3PQF	98	98
G3XDY	72	89
GI3WSS	67	83
G2HKU	55	58

(Last appearance of this Table will be next month. See text for new tabular arrangement.)

Note About XU1AA, Phnom Penh, Cambodia

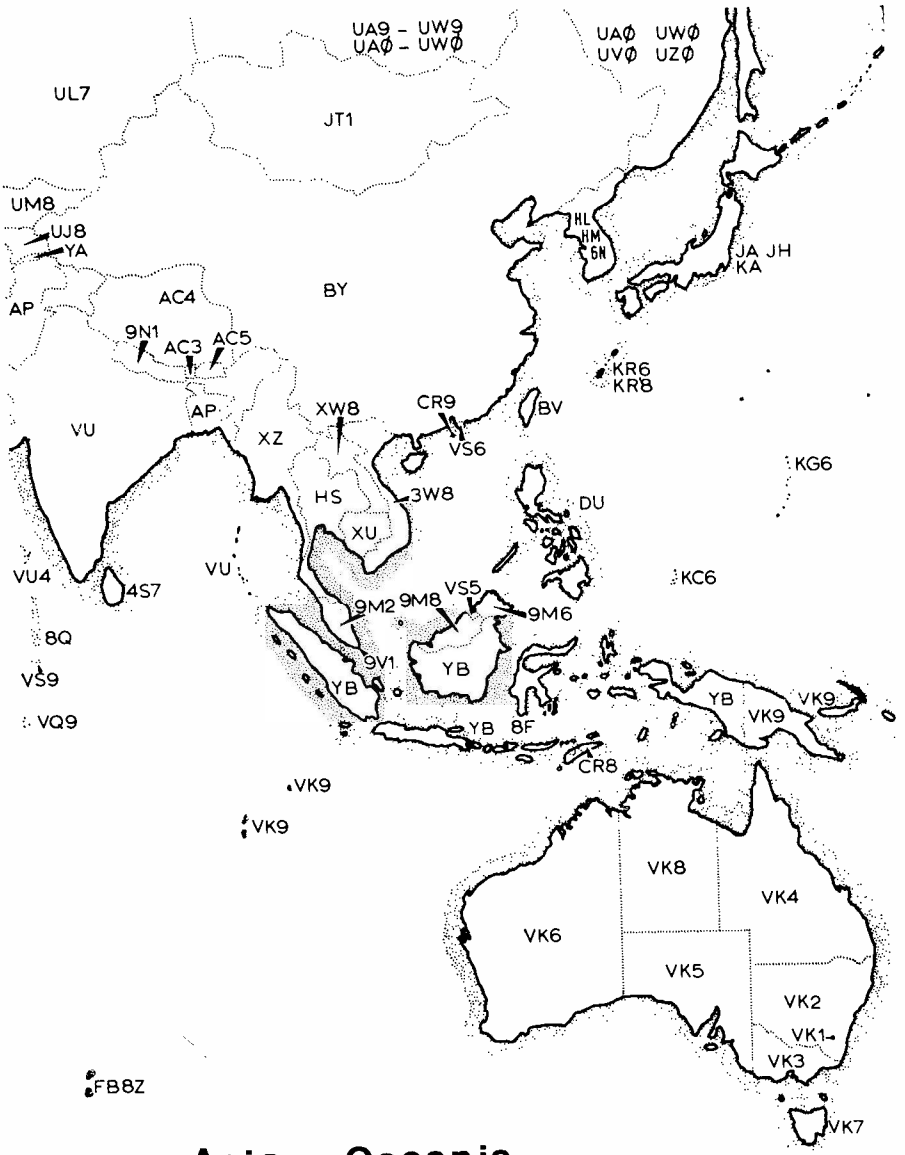
An extraordinary story has been unfolded by KG6IJ, who writes a DX piece for that area in the Honolulu *Star-Bulletin*. It seems that contacts with XU1AA, even where genuine, could have been "illegal" in the sense that they had not been fully cleared either with the I.T.U., the ARRL for DXCC or even the local Cambodia authority. On the other hand, apparently any licensed *foreign* amateur (meaning VE/US) can get permission to operate XU1AA, which is an all-band station established at the University of Phnom Penh—though it seems that its operation is not permitted to the 100 or so members of the P-P Radio Club! After an effort by VE7IR, two prominent JA DX-types seized on this situation during the recent *CQ* World-Wide Contest to get over to Phnom Penh, working the world signing XU1AA on all bands 10-80m. (except that they always called "CQ DX no JA"!).

The upshot was that the Cambodian authorities cast a baleful eye on the whole operation—and, for the JA's concerned, even more alarming was the attitude of the C.I.A. (American Central Intelligence Agency). These JA's left their gear (apparently since confiscated) at the scene and scuttled home to Japan, vowing "never again"!

From the foregoing, you can work out for yourself the value of that contact you may have had with XU1AA—though it could have been a genuine QSO, radio-wise, the probability is that it will be the last you hear of it. (Cambodia, Laos and Viet-Nam are, of course, in the South China war zone, and any sort of radio amateur activity in that area would be suspect by somebody.)

The HF Bands

For most people, unless they can get up early and start work late-ish, or can be home before dark, these bands have been darn near useless—which is not to say things haven't been buzzing. Just the lot of the workers—be different, come the Revolution! As regards *Twenty* "Not exactly a daylight band but



Asia Oceania

mighty patchy after dark" is the view of G3NOF (Yeovil). Early-morning long-path VK's around 0800 have been workable and early in the period, the evenings were notable for VE6, VE7, W6, W7 and KH6 at times, but towards the end of the band was nearly always closed by darkness. Don's SSB contacts included FR7ZG, HC2GG/1, HK3LT, HK5SL, JA2PJC, K7NHG, KH6BB, VE6ABM, VE7BNJ, VE7KC, VE7VP, VK's, W6PL, W7PJL, W2GHK/VP9, ZL2AMI, ZL4PM, ZS's (including ZS1ANT in Sanae, Antarctica) and 9Y4T.

Now to W6AM (Long Beach, California). The old maestro is still at it—all *Twenty* this time, with VR1C, FB8ZZ, VK7LJ, KJ6BZ, W6IL and W6HS, also VR6TC on Pitcairn, and K6UYC setting up in competition to Don with rhombics on a mountain-top—but he has to borrow ground rods from W6AM! Don has received the filled-in QSL, as predicted, from ET3ZU/A (Jabal-at-Tair) and 3CØAN, Annobon.

G2DC is in general agreement with the G3NOF opinion already mentioned, that things have been rather disappointing with an early descent into "winter" conditions. He holds out little hope, for instance, of finding much in the Central Pacific until March. However, all is not lost, and G2DC showed it by working CR6DA, ET3USD, JA1-Ø,

LU6FA, PY's 1-7, UWØBH, UWØLI, VP2A, VK2-8, VK9ES, VK9JV, ZE1BT, ZE8JN, ZS2CW, ZL1-4, 7Q7AC and all W call areas (on CW, of course).

For G3DNF the pickings were, in his own words, precious little. Things perked up a bit during the *CQ* W-W Contest, and Gordon came out with ZE2KV and ZD3Q before cranking the bandswitch elsewhere.

To GM3YOR, *Twenty* was a new experience in Amateur Radio, and it was worked to the tune of EL3BN /MM, PY2ELT, TY1ABE, UL7LE, UI8BL, UJ8FR, UK6AEE, UA9BX, UK9CBJ, UW9AK, UW9YQ, VE7ZR, VO2DP, VP2GLE, VE1OU, W1TW, W1MMI, W2ZY, WB2WJA, W3ARK, W4BJ, W4BYM, W4KRU, WA4PFE, K9IU and YV5CEP.

There are, of course, those who, when called, do *not* make the appropriate noises; for G3ZPF, these were notably 5U4 and 5V8—and a TU4 who came back but disappeared into the sharsh. David noted that the band closed at *exactly* 1758z on this particular night! However, there is always a consolation somewhere, and in this case there were IC8, OX4, FR7 and PZ9 to swell the country total to 102.

Elsewhere we mentioned W4WFL/1 as moving his QTH—it obviously seems to have done the trick, as the p.s. to his letter indicates that after writing he worked FPØCA, HS1ABD, JW1EE, EA9ED, XX6IK, ET3DS and 3B8CR, all CW new countries, as well as LX2CQ, SZØGA and PJ8AA, new on SSB. Looks like those new wires will be humming for a while.

EA9EO, JA's, KL7HDB, KL7MF, G3RSP/MM, TY1ABE, UKØKAA (Wrangel Is.) and VK2BPN were enticed into the log by the CW emanating from GM3OOK. Incidentally, Jake indicated that he would be around again as ELØA /MM, as he expected to be ship-borne before Christmas.

Ten and Fifteen

While these two have been of only academic interest to the majority, thanks to the "opening times" they have offered, this is by no means an indication that they have been useless. Far from it. In fact, even when we are at the bottom of a sunspot cycle, they should offer the same sort of possibilities in the way of anomalous propagation as on VHF—which means all of Europe and even over to the North African seaboard. And what better bands are there for the local natter-channel? Indeed, if we do not make use of these bands at times when they are dead to DX, we can expect that with the increasing pressure on the RF spectrum envious eyes will be cast at them.

Unusually, G2HKU seems to have given a little interest to 21 MHz doings, and came up with SVØWOO, UK9AAD, UW9WL and UWØAF, all worked on CW.

Fifteen and Ten were both daylight efforts as far as G3NOF was concerned. *Fifteen* first, where JA (LP at 0800, SP at 1000) VK by shortpath around 1230, and W's from noon till the fall of darkness, about sums it up. For *Ten*, it was very much a day operation, and then with precious little that was not North-South. His 21 MHz list shows JA3LDH, JA3EMD, JA4KFA, JA5FDV, JA5FHK, JA6TTO, JH1XYB, JH3FGV, JH3FUS, VK6WB, VS6BE, VS6DO and the U.S. *Ten* came up with W3, W8, ZE1CW, ZS1KZ, ZS4PN, 3B8AW, 3B8CZ, 9J2DT and 9J2JY.

G2DC looks at things from the point of view of one who can pick and choose his band and his time; he found *Fifteen* a bit of a disappointment, but *Ten* most interesting (once the QRM had died down!). It gave with CR7IZ, CX2CO, JX2HK, PY6FA, RA9FCA, lots of UA9's, UAØARC, UI8BL, UL7TA, UD6BW, VP2A, VK2EO, VK6AI, VK6SA, VU2JN, all W call areas, ZE2EK, ZS2RM, ZS6KT, ZL3IS, 7Q7AA, and 9P2TR. *Fifteen* showed up EA9AQ, OX3XX, PY's, LU's, again all W call areas, VE1-5, 7, and 8, ZE2KL, ZS1MS and VK5NO.

G3DNF and his CW are on the record with titbits from *Ten* as follows: 4X4TI, DJ6QT/CT3, 4M5AAS, CX7CO, VP2AAA and VP9BK, earlier in the month. As for *Fifteen*, the tally of scalps included various W's, UD6AR, JR1ELT, VA2UN, CX1JM, EL2CZ, OB4PF, 4M5AAS, VK7GK, 9F3USA—here again it seems as though the *CQ* W-W Contest helped things along a little.

The collection of /MM calls is still the interest for G2NJ (Peterborough) and this month he comes up with LA2MA/MM, found on *Fifteen* on November 9, when the ship was E. of Leeward Is. Another bit of news is that G5NX/LA/MM is now busy writing out the cards following his recent trip to Australia, which was his *twentieth!*

Conclusion

That's the end of another piece, and the end of another year, too. Let us hope that 1972 will see more peace in the world, and more DX on the bands; may pollution of the ether decrease; and may TVI reduce to infinitesimal proportions in Channel I areas. With that happy idea we leave you again; deadline for correspondence and final Table entries for February CDXN will be **January 10,** with everything addressed CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM, the only QTH for this feature ("side-door" correspondence cannot be accepted). Take care, *73 es DX.*

AMATEUR-BAND INTRUDERS

According to the December issue of *Region I News*, produced by G2BVN as secretary of Region I, I.A.R.U., the intruder watch on the amateur bands has disclosed that a number of stations—with callsigns like 7A1, 3K5, LVO, K21, PZF, MIY, ZTW, ZNA, VGU, ZGA, C45, XDE and JOT—have been making their appearance in the 21·00 to 21·11 MHz area of our 15-metre band. Though these particular transmissions (and there are others, emanating from the USSR and Czechoslovakia) are attributed to "diplomatic sources", they are unauthorised intruders in an exclusive amateur allocation and should be treated as such. We do not pretend to know the actual origin of these signals—but we could have a good guess at some of them! (Live and let live. *Ed.*).

SLIGHT CORRECTION

In connection with his article on the JR-310 Rx in the December issue, G3DNF says that in the last line of the left-hand column on p.602, the stray capacity should have read ·02 μF, and not as stated.

AMATEUR RADIO IN SPAIN

From the latest issue of G2BVN's *Region I News* we get it that the total of licensed amateurs in Spain is 1383—of whom 141 are in or around Madrid and 134 in the Barcelona area.

JAPANESE NUMERICAL SUPERIORITY

On p.400 of the September issue of SHORT WAVE MAGAZINE we gave some I.A.R.U. world statistics on radio amateur licensing, mentioning a total of 101,000 Japanese AT-stations. It seems now that the figure is in fact nearer 260,000! Of course, this is much inflated by the "phone-class only" operators (more than 222,000) who are limited to 10 watts Ae. output power on any band except 14 MHz (on which they are not allowed at all). Japanese amateur licensing is in four categories: First-class, including a Morse test at 50 characters per minute in Japanese code, with a power limitation of 500w., there being fewer than 3,000 JA's qualified in this class; the second-grade rating, totalling at present nearly 12,000 amateurs, demands no Jap. code but 9 w.p.m. in English, with a power limit of 100 watts output. The third-class category is interesting in that it is for the CW-only operator, who has an easy R.A.E.-type exam. to pass, with a 5 w.p.m. Morse test in English—but he is limited to 10 watts on all bands except 20 metres (operation not permitted) CW only; there are 20,000 JA's licensed in this category. The Japanese amateurs we mainly hear and work are in the first and second grades.

AMATEUR RADIO IN INDIA

We are informed that a new amalgamation, involving what used to be the "Radio & Electronics Society of India", has been formed, to be known as the Amateur Radio Society of India. The *Indian Radio Amateur* will be published from Delhi and the QSL bureau address is Box 6538, Bombay 26, India. Of course, these arrangements were made and announced before the war situation arose affecting India and Pakistan—the AP's are not in any case covered by the new formation. We may expect that, if the war is still going on by the time this appears, Amateur Radio activity in both countries will have been prohibited. The shut-down of innocent pursuits is, like truth, always one of the first casualties of war.

SOME FURTHER J-O-T-A NOTES

In addition to the Scout Jamboree-on-The-Air story on pp.616-619 of the December issue of SHORT WAVE MAGAZINE, we have had reports covering:

GB3CSM, Nr. Truro: This was a regular Scout camp, pitched in very bad weather at Ladock, on a hillside involving humping the gear up a steep path. To start with, only 80m. was worked (very satisfactorily) using a dipole Ae., until the Wx moderated sufficiently on the Saturday to get up a 40ft. pole capped with a TA-33, which gave them 14 MHz coverage. These two bands were run alternately until close-down on Sunday, in the course of which 78 Scout stations were raised from 126 contacts, including ZL on 80m. The report says "the station was operated in true Scout style, under canvas" and, in spite of the weather, everyone enjoyed the week-end and all concerned, including the cooks, loggers and helpers, intend to be in on next year's J-O-T-A.

GB3TJA, Torquay: This station was run by the Torbay Amateur Radio Society for the 11th Barton (Torquay) Sea Scouts, at their Hq. Contact was made with some 40 J-O-T-A stations in 29 countries, out of the 157 QSO's logged during the weekend. The Scouts did a yeoman job with aerial erection (here again they had rotten weather) and as well as the necessary "camp duties", the lads helped with the logging. The event was thoroughly enjoyed by everyone taking part—including the Scoutmaster's XYL who supervised the culinary arrangements. The Torbay Club has already been asked for "the same again, please, in 1972".

" . . . Main interest here is operating . . . "

DESIGN FOR A THREE-BAND CW TRANSMITTER

FOR LOW POWER PORTABLE OR FIXED-STATION WORKING

T. HARRISON (GM3NHQ)

FOR the past few years the amateurs in the Dundee area have been participating in the annual field-day contest in June, the equipment used being contributed by the operators taking part. In the author's case, this was usually the transmitting equipment for one station. However, the passing years take their toll of men and radio equipment alike, and it became obvious after the 1969 event that the all-band transmitter that had served over the years would not last much longer. We were thus faced with the problem of (*a*) re-furbishing the existing all-band unit, or (*b*) building a replacement. Since any more modifications to the already much-modified transmitter would probably only have made matters worse, it was decided to start afresh with a new unit, for the objectives were:

(1) At least three-band coverage, with VFO control, the bands being specified as 1·8, 7 and 21 MHz,
(2) A power level of 10 watts, to comply with the contest requirements,
(3) Full break-in CW operation, to be used in conjunction with an AR88 receiver—preferably not to require modification,
(4) To be a valve design, since an AC mains supply is available at the portable location.

The design finally evolved is given in the block diagram, Fig. 1, and this shows the main points of interest of the unit.

The transmitter uses five valves, four of these in the RF section, the fifth operating to mute the receiver during "key-down" periods. The exciter section is a mixer-type VFO, giving output on 1·8, 7 and 21 MHz into the PA stage, which uses a 2E26. This valve can run at more than the required 10 watts if the full rated voltages are applied, but since the maximum plate dissipation is stated as 13·5 watts, this satisfies portable requirements. In this instance, the plate voltage is limited to 300v., and the valve runs comfortably at the 10-watt level. However, before considering the transmitter schematic diagram, it may be worthwhile discussing the reasons for adopting the various design features indicated on the block diagram.

Design Considerations

The main feature of the design is the use of a mixer-type exciter. There are three ways of generating a signal at the required operating frequency, either (*a*) by using a variable oscillator operating at the desired transmitting frequency, and raising the power level by means of the following stages; (*b*) by starting off with a low frequency variable oscillator, and multiplying this to the final operating frequency by means of intermediate stages before the high power output stage, or (*c*) by heterodyning a low frequency variable oscillator with a high frequency fixed oscillator to give a beat at the required operating frequency, no further multiplication then being required.

All of these systems have their advantages and disadvantages, and the final choice depends mainly on the frequency of operation, since it is generally easier to build a stable, T9 note, variable oscillator for a low frequency than for a high frequency. If, for example, operation on the 1·8, 3·5, or 7 MHz bands is required system (*a*) could be used quite easily, since it is not too difficult to build a stable variable oscillator up to 7 MHz. As the operating frequency is increased to cover the 14, 21 and 28 MHz bands, oscillator construction becomes more difficult, though not necessarily impossible, and it is generally easier to use system (*b*) with the variable element operating at low frequency for good stability, followed by a number of multiplier stages to give the required output frequency. However, the greater the multiplication factor the greater is the stability required of the original oscillator, since any defects in the original will be magnified in the output. In addition, the multiplication process is a potential source of harmonic generation, which increases the probability of TVI. In addition to this, we have the problem of "break-in" keying, which requires that the VFO be keyed. This may introduce a slight chirp, which, when magnified, will

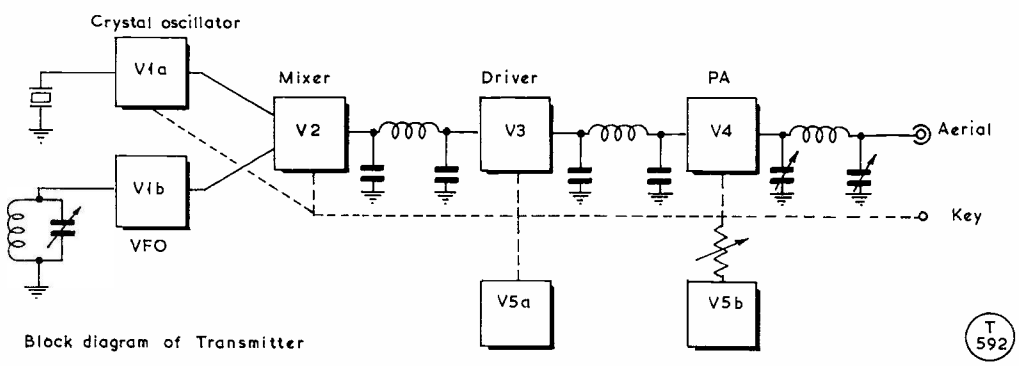
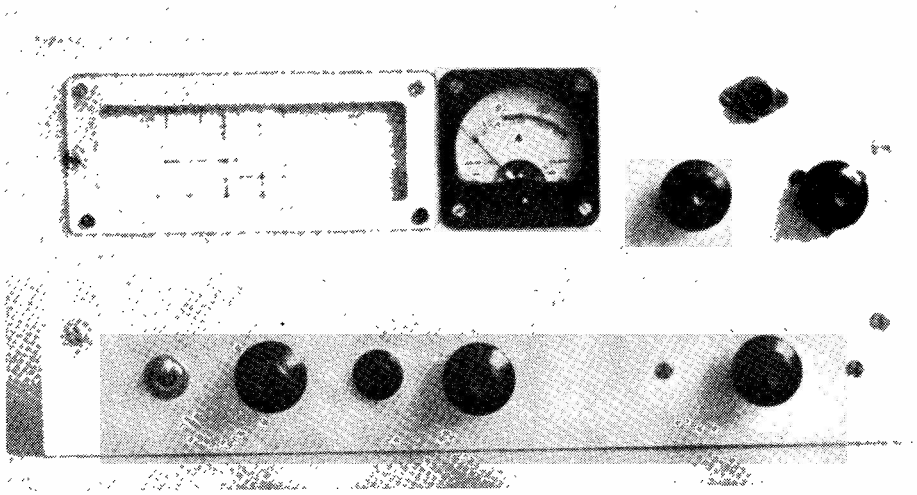


Fig.1 Block diagram of Transmitter

Fig. 1. Block schematic of the GM3NHQ Three-Band Tx.



Showing front-panel layout and arrangement. The dial mechanism is home constructed, marked for the bands covered. Controls are, left to right; Net/operate switch, tuning, key jack, exciter band switch and PA band switch. The two controls below the output (Ae.) socket are the PA loading and tuning capacitors VC2, VC3.

give an unacceptable output signal. None of these problems are insurmountable, of course, but their solution is difficult. The third alternative, the heterodyne system, avoids all these difficulties—but, as may be expected, introduces a number of other problems. These, however, are easier to overcome, at least in the author's experience.

The great advantage of the heterodyne system is that it allows the required signal frequency to be generated directly while using a low frequency variable oscillator, with its good stability and tone, this being combined with a high frequency crystal oscillator, which will also produce a good note by virtue of the crystal, the VFO and xtal frequencies having been chosen to give a beat at the required frequency. Since both variable and fixed components of the output are stable and T9, the resulting output signal will also be stable and T9, and any defects that do exist in the VFO and crystal signals will not be magnified in the output. Since the required signal is generated without further multiplying stages, the harmonic generating problem is greatly reduced and, what is more important for contest working, full break-in operation is easy to achieve without introducing chirp, since only the crystal oscillator need be keyed to remove the output signal. As the VFO is left running during both "transmit" and "receive" periods, there will be no drifting normally associated with the switching on and off that is required under systems (*a*) and (*b*). However, as mentioned earlier, this introduces its own problems, which must be considered at the design stage.

When the VFO and crystal controlled signals are combined, the mixer output contains many signals in addition to the desired one, comprising (1) the original VFO signal and possibly its low-order harmonics; (2) the crystal oscillator beat and its harmonics; (3) the sum of the two components; and (4) the difference between the two components, either of which may be the desired signal. (Also present will be a number of beats between the various harmonics which will, however, be of low order and can usually be ignored.) The tuned circuits associated with the mixer, driver and PA stages have the job of separating the desired signal from all the others, and in order that this can be done with reasonable efficiency, there has to be adequate separation between the required output and those others. It will be obvious at once that if either the VFO or crystal frequency is low, one or other of the unwanted beats is going to be very near the operating frequency, and will be very difficult to reject completely. Therefore, although it is desirable to have the VFO frequency low for good stability, from the spurious response point of view it should not be *too* low. A compromise has to be found, the degree of compromise depending on the frequency of operation. For example, for 1·8 MHz working, a 1·2 MHz crystal oscillator could be used with a 600-800 kHz VFO since the 1·8 MHz tuned circuits following would be able adequately to separate out the desired signal. However, for 21 MHz output, a 20 MHz crystal oscillator and a 1 MHz VFO would be unsuitable, since the 21 MHz tuned circuits following would not discriminate between the required signal and the 22 MHz spurious beat. A VFO around 4 or 5 MHz with a crystal frequency about 16-17 MHz would be more suitable.

It is also important to avoid VFO or crystal frequencies which, although adequately spaced for spurious-signal rejection, have harmonics which fall within the band of operation. For example, a 10·5 MHz xtal with a VFO at 3·5 MHz would seem an excellent choice for 14 MHz output. However, the fourth harmonic of the VFO falls within the 20-metre band and would be radiated at appreciable strength along with the desired beat signal. It will be obvious that a great deal of thought must be given to the choice of crystal and

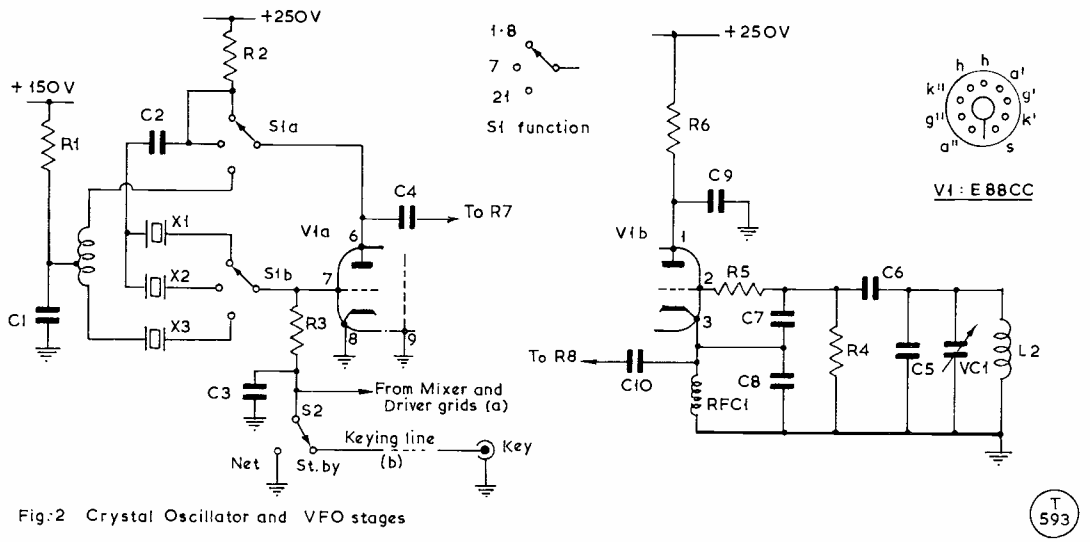


Fig. 2 Crystal Oscillator and VFO stages

Fig. 2. The crystal oscillator and VFO stages.

VFO frequencies if spurious emissions are to be avoided.

In spite of the difficulties listed above, the mixer system has proved an excellent choice, since it has the priceless advantage of easy break-in keying. The great difficulty with BK operation is that the transmitter oscillator stage must be shut off during receiving periods and must go on and off at the keying speed without introducing chirp. This is hard to achieve under the usual multiplier system since it is difficult in any case to key a VFO without producing at least a slight chirp, and the following multiplier stages will magnify any chirp that does occur, making the resulting output completely unacceptable. With the mixer system, however, only the crystal oscillator need by keyed to shut off the output frequency, and, since the crystal oscillator is virtually chirp free, at least at normal frequencies, the resulting output signal will also be chirp-free. The only problem that arises is with the following driver and PA stages which will over-run if drive is removed—this is easily avoided if *all* these stages are keyed with the oscillator, The writer has found that the easiest way of accomplishing this is to use grid-block keying, the cut-off voltage being applied to the control grids of the oscillator, mixer, driver and PA stages to ensure full signal cut-off, this method being used in preference to the more normal cathode keying, which is prone to introduce key-clicks. These are generated when large values of cathode current are broken by the key, whereas the valves are switched on and off "electronically" by the bias voltage when grid-block keying is used. It is the author's experience that the key-clicks are more important than the harmonic problem when stations are operating close together.

The other design feature indicated on the block diagram is the use of the *pi*-network between the mixer, driver and PA stages. This was used (1) as an attempt to prevent any harmonic amplification taking place at the driving stages of the transmitter, and (2) to ensure stability and freedom from parasitic oscillations at the driver and PA stages. The PA stage output circuit is also *pi*-network for easy matching to various serials. The mixer and driver stage *pi*-networks are fixed-tuned, whereas the PA output circuit is variable, in the usual way.

Table of Values

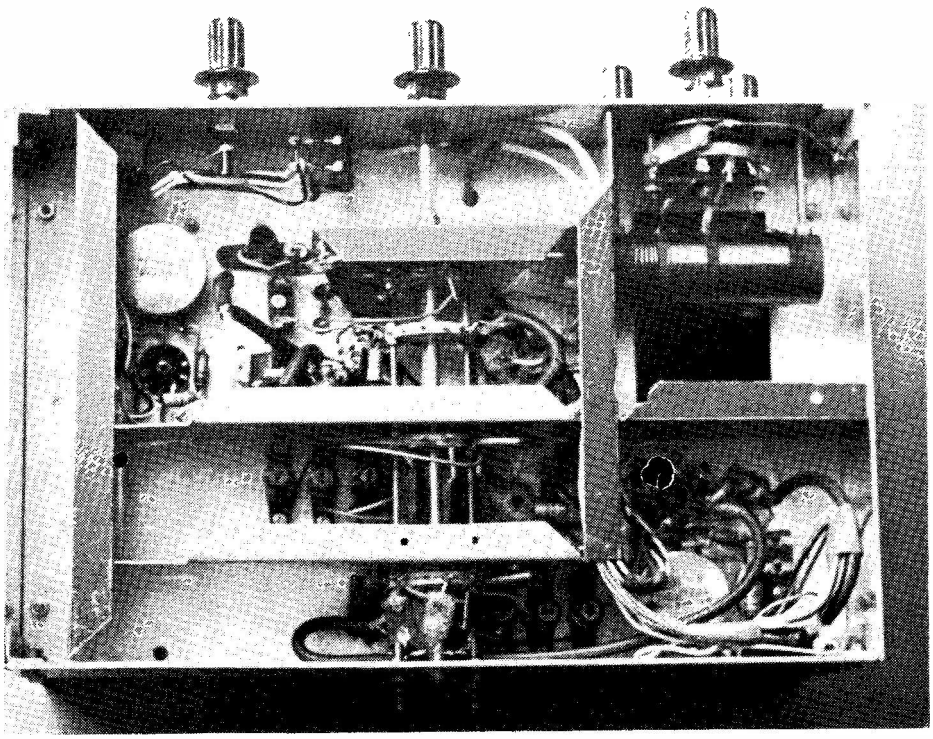
Fig. 2. Xtal Oscillator and VFO Stages

C1, C3, C9	= ·01 μF, disc ceramic	R4	= 100,000 ohms
C2	= 470 μμF	R5	= 33 ohms
C4	= 10 μμF	RFC1	= Min. RF choke
C5, C6	= 100 μμF	L1	= 30t 26g. c/w on ⅜in. dia. former, tap at 10t.
C7	= 680 μμF	L2	= As L1, no tap
C8	= ·001 μF	VC1	= 50 μμF air spaced var.
C10	= 25 μμF		
R1, R2, R6	= 15,000 ohms	V1A, V1B	= E88CC
R3	= 47,000 ohms		

All fixed capacitors silver-mica except as stated.

Pi-Coupling All Through

These, then, are the main points of interest in the transmitter as indicated in the block diagram. The crystal oscillator and variable oscillator are both combined in one valve, V1A-V1B, which is an E88CC twin-triode, the output from each oscillator feeding a further E88CC twin-triode V2A-V2B which is the mixer stage. The mixer output is tuned to the operating frequency and coupled into the driver stage by the *pi*-network, which is switched for each band. After amplification in the driver stage, the signal is coupled to the PA stage by a further *pi*-network. The PA output is matched to the antenna by a similar network, making a total of three *pi*-networks tuned to the operating frequency to select only the desired signal from the mixer output.



The general construction under-chassis for the transmitter as built by GM3NHQ. The generous screening is an important factor in attaining stability and generally consistent operation. The screens are flanged so that the bottom plate can be bolted to them using self-tapping screws.

As the diagram shows, the crystal oscillator, mixer, driver and PA stages are all keyed, leaving only the VFO running during "key-up" periods. The keying line also operates the receiver muting valve, V5, which develops the necessary negative bias voltage, applied to the receiver AVC line, muting the receiver durng keying periods. An aerial T/R switch was not thought necessary since there is usually a separate receiving antenna when operating /P.

Transmitter Circuitry

Let us now consider the circuit diagrams of the transmitter, beginning with the VFO and crystal oscillator stages shown in Fig. 2.

The VFO section, V1A, is a conventional parallel-tuned Colpitts oscillator, using one half of the E88CC. This valve has a screen between the two triode sections, which it was felt would provide a certain amount of isolation between the two oscillators within the one valve. The VFO is arranged to cover 3·8-4·3 MHz to suit crystals that were at hand. This range also provides a reasonable compromise between stability and spurious emission requirements.

The crystal oscillator V1B uses a simple Pierce circuit for the 1·8 and 7 MHz bands, the circuit being re-arranged into an overtone configuration for the 21 MHz band. The crystal frequencies used are 6·0 MHz for 1·8 MHz; 11 MHz for 7 MHz; and 5·66 MHz, giving third harmonic output on 17 MHz for the 21 MHz band. These crystals are all available on the surplus market at reasonable cost. The oscillator grid resistor, R3, is connected either to earth or the keying line by S2 to provide a netting facility.

The mixer stage is shown schematically in Fig. 3. V2A-V2B is another E88CC twin-triode. The arrangement shown was used since it offered better suppression of the VFO component in the mixer output—the VFO operating at 3·8-4·3 MHz has a second harmonic near the 7 MHz band which could easily slip through. The VFO input is to V2A cathode with the crystal oscillator feeding the control grid, the resulting mixtures appearing at V2A anode. The VFO is also coupled to V2B grid, the idea being that the VFO component at V2B anode will cancel that at V2A anode, the two outputs being equal in amplitude but of opposite phase. Consequently the output from the mixer will have a minimum of VFO component.

The mixer output is *pi*-coupled to the following driver stage, a separate network being switched for each band. The mixer grids are both returned to the netting switch so that crystal oscillator and mixer stages are switched together to provide a netting signal. [over

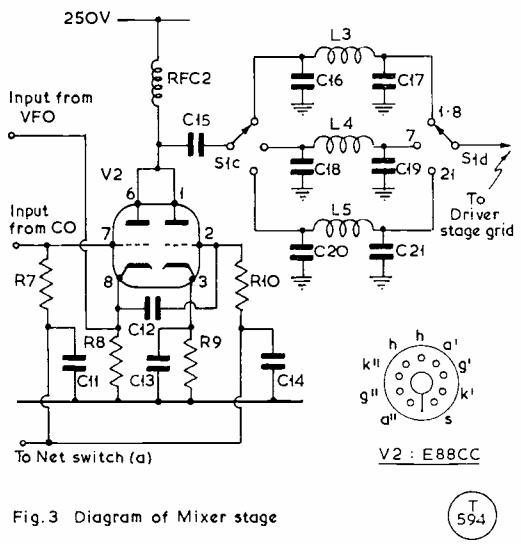


Fig. 3. Circuit of the Mixer Stage in the GM3NHQ transmitter.

Table of Values

Fig. 3. Mixer Stage Circuitry

C11, C13, C14	= ·01 μF, disc ceramic	C21	= 68 μμF
C12, C15	= ·001 μF, caramic	R7, R10	= 100,000 ohms
C16	= 200 μμF	R8, R9	= 220 ohms
C17	= 600 μμF	RFC2	= Min. RF choke
C18	= 50 μμF	V2A, V2B	= E88CC
C19	= 220 μμF	L3	= 80t. 36g.
C20	= 25 μμF	L4	= 35t. 28g.
		L5	= 10t. 26g.

All coils on ⅜in. dia. former with dust core. Capacitors silver-mica except as stated.

Driver-PA Stages

The driver and PA stages are shown in Fig. 4. The driver stage gives straight-through operation on all bands and is quite conventional, the only point of interest being the *pi*-coupling to the PA stage grid. An EF183 is used to produce adequate drive into the 2E26—in fact around 2 mA is available on all bands. The driver grid is connected to the netting line. However, the netting signal may be too strong for delicate ears—if so, return the grid resistor R11 to the keying line instead.

The PA stage is conventional using a 2E26 at a power level around 10 watts depending on the HT supply used. The output is again *pi*-tuned, L11 covering 21 MHz, L10 and L11 for 7 MHz and the addition of L9 lowering this to 3·5 MHz. The padding capacitor C38 brings the resonant frequency down to 1·8 MHz. This odd method of tuning was adopted to provide coverage on 3·5 MHz for local working with the PA doubling and the mixer/driver stages on 1·8 MHz. Operating bias is developed across R15 by the grid current through V4 when the key is down. With the key up, the keying-line voltage is heavily negative, cutting off all the stages connected to it.

Control

The control stages are shown in Fig. 5. V5A-V5B is a 12AU7 twin-triode, one section acting as the power control, the other developing a negative voltage which is applied to the receiver AVC line to mute the Rx during transmission periods. V5A is the power controller, with the PA screen connected to V5A anode. The voltage at the anode is controlled by the current drawn through R16, this current in turn being determined by the bias on the control grid set by VR1.

V5B is arranged with the anode connected to earth through R17, the cathode going to a point negative to earth through VR2. When the key is open, the control grid is heavily negative to earth and the valve does not conduct. No voltage is developed across R17 and the receiver operates normally. When the key is closed, however, the grid voltage approaches the cathode voltage and the valve conducts, drawing the anode voltage down below earth. This negative bias applied to the receiver AVC line cuts off the receiver when the key is down. Setting up the circuit is simple—VR2 is adjusted, with the key open, to a point which just cuts off V5B.

Construction

The construction of the transmitter is fairly straightforward and the layout chosen by the author can be seen from the drawings and accompanying photographs. The main component is the wave change switch which is rigidly supported by the interstage screens. All the components are connected to tag strips which are mounted on these screens. The main chassis components, screens and switches were all "trial-fitted" before any wiring was started. Once all the likely holes had been made for cable runs and feeds from one stage to the next, wiring up of each stage was started with the oscillators, the screens fitted and remaining stages completed in turn. This system avoided any "keyhole" soldering of components. There is, of course, no reason why the layout shown in the diagrams should be used—no doubt other constructors will have their own ideas.

There are no complications in adjusting the transmitter for operation. It is probably best to start off

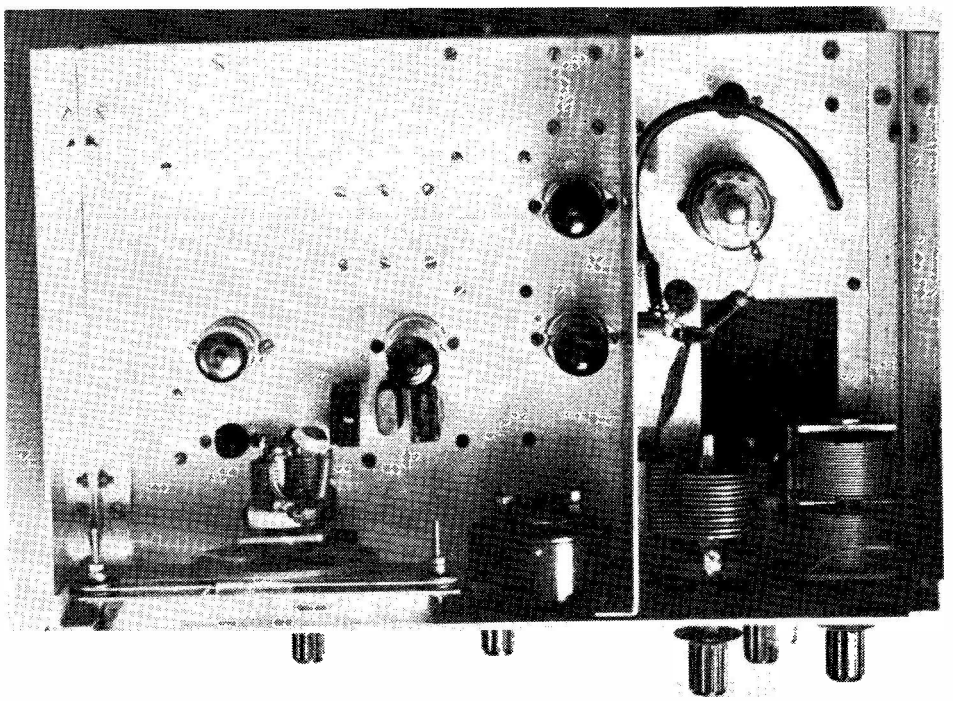
(cont'd p.668

Table of Values

Fig. 4. Driver and PA stages

C22, C23, C24, C25, C33, C34, C35, C36	= ·01 μF, disc ceramic	R12	= 33,000 ohms
		R13	= 270 ohms
		R14	= 1,000 ohms
		R15	= 15,000 ohms
		VR1	= 1-megohm potentiometer
C26, C37	= ·001 μF	RFC3, RFC5	= Min. RF choke
C27	= 200 μμF	RFC4	= 2·5 mH anode type
C28	= 600 μμF	V3	= EF183
C29	= 56 μμF	V4	= 2E26
C30	= 220 μμF	L6, L7, L8	= As L3, L4, L5, Fig. 3
C31	= 25 μμF	L9	= 30t. 26g.
C32	= 75 μμF	L10	= 15t. 26g.
C38	= 260 μμF	L11	= 5t. 20g.
VC2	= 140 μμF, air-spaced		
VC3	= 2 x 500 μμF, BC type, air spaced		
R11	= 100,000 ohms		

Fixed capacitors silver-mica except where stated. Coils L9, L10, L11 on 1in. diameter formers.



Upper-side view of the chassis layout. The VFO tuning capacitor should be positioned to suit whatever dial mechanism is chosen—in this case it was home-constructed. The large cut-out in the PA compartment should be ignored!

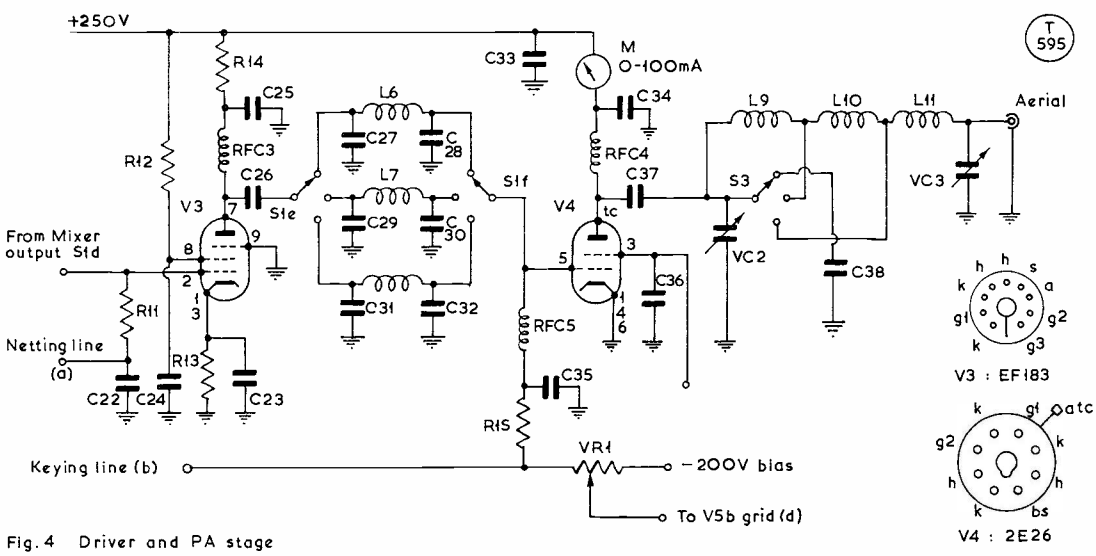


Fig. 4 Driver and PA stage

Fig. 4. The Driver and PA stages for the Transmitter.

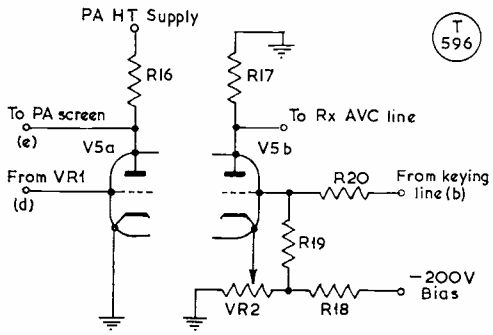


Fig.5 The Muting and Power Control stages

Fig. 5. Muting and power control stages, which can be modified —see text. Values here are : R16, 15K, 5w.; R17, 100K ; R18, 15K, 5w.; R19, R20, 220K ; VR2, 10K wire-wound potentiometer ; V5A-V5B, 12AU7. See Fig. 6B.

with the oscillators, ensuring that these are working satisfactorily at the correct frequencies. An absorption wavemeter, GDO or some sort of RF indicator is very useful in setting up the overtone oscillator, mixer and driver stage tuning. All the circuits are set up for maximum drive on each band and a minimum of 2 mA should be obtained on all bands. The selectivity of the 1·8 MHz coils is rather high and the mixer and driver coils should be stagger-tuned to give a flat response over the CW section of the band.

Power supply requirements are modest—6·3 volts for the heaters, 60 mA at 250 volts, and about 10 mA at 200 volts negative. The PA supply may be anything from 300 to 500 volts, capable of supplying 60 to 100 mA.

Following two years' experience, a couple of modifications were incorporated to improve operation of the transmitter in conjunction with the usual receiver.

First, it appeared that the 17 MHz overtone oscillator had a slight but noticeable chirp, probably due to the variations in the HT line voltage as the unit was keyed. Fortunately, a source of fundamental crystals for the 17 and 25 MHz range appeared in the *Magazine* at reasonable cost. In order to give the possibility of future coverage of the 28 MHz band, a 25 MHz crystal was purchased and the crystal oscillator circuit was modified as shown in Fig. 6A. A further fundamental-type xtal allows the use of the Pierce circuit on all bands.

Secondly, the power control arrangement was found to be a needless luxury! Originally intended to set the power level at exactly 10 watts with optimum settings of the output *pi*-network, it was found that there was no time during contests for such refinements, the power being simply adjusted by the loading capacitor VC3. The PA screen is now fed from the PA HT supply through a dropper.

The other modification finally incorporated was necessary due to the muting arrangements in the receiver normally used. Applying the negative bias to the AR88 diversity line produced unacceptable key thumps in the receiver output and it was obvious that some other muting arrangement was required.

The normal method of muting this particular receiver

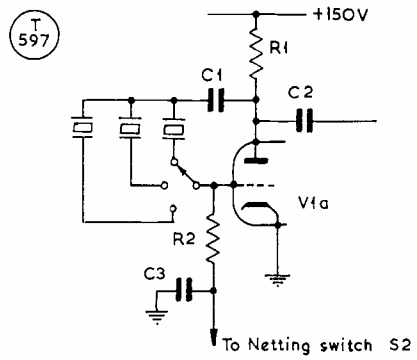


Fig.6a Modified Oscillator circuit

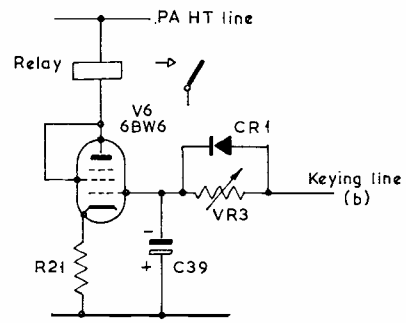


Fig.6b Revised Receiver Muting circuit

Fig. 6A. Modified oscillator curcuit, values : .001 μF s/m ; C2, 25 μμF, s/m ; C3, .01 μF, disc ; R1, 15K ; R2, 47K.
Fig. 6B. Revised Rx muting circuit, see text. C39, 2 μF ; R21, 270 ohms ; VR3, 10K potentiometer ; CR1, BY-100 ; valve V6, 6BW6.

was to open the RF stage cathode return to earth and it was decided that some sort of relay should be incorporated into the transmitter change-over system. The circuit finally evolved, as Fig. 6B, gives an instantaneous closure of the relay as the key is pressed but incorporates a delay to prevent the relay de-energising during the space between dots and dashes. The delay is adjustable to accommodate various keying speeds and give a slight delay after keying stops before the receiver comes on. This system cuts down unnecessary thumping from the receiver and has been used successfully in the past year without problems. The circuit was installed around the V5 position. The bias resistor is adjusted to give reliable closing of the relay without drawing an unnecessarily heavy current from the HT supply. The relay was operated from the PA HT line to avoid fluctuations on the oscillator plate voltages. The relay used had a 1500-ohm winding and the cathode resistor of 1K gave operation with about 30 mA through the 6BW6. Different relays will require a different value of R21 (Fig. 6B). The circuit operates as follows:

When the key is open, the 6BW6 is cut off by the keying line bias, which changes C39 to the full negative bias voltage through VR3. When the key is closed, C39 discharges immediately through CR1. The 6BW6

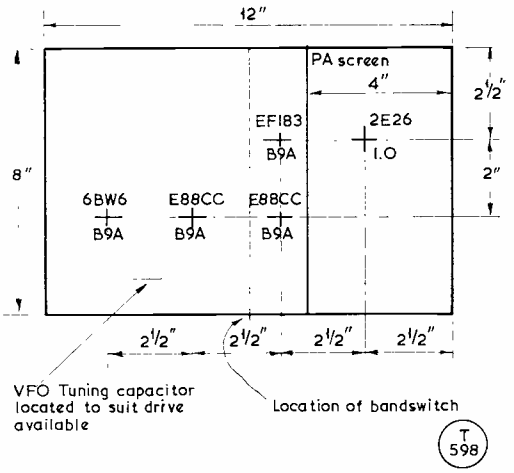


Fig. 7. Chassis plan upper-side, with location of main items.

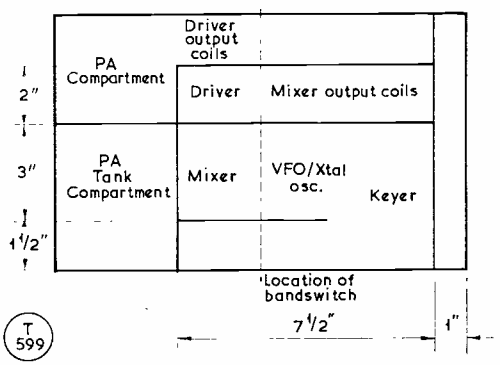


Fig. 8. Inter-stage screening, underside of chassis.

control grid voltage falls to earth and the valve conducts, energising the relay. When the key opens, C39 charges slowly through VR3, delaying the time when C39 reaches cut-off voltage. This time-delay depends on the setting of VR3 and should be adjusted to hold in during "letters" but opening promptly when keying finally stops. The relay contacts are arranged to open the receiver RF stage cathode when the relay is energised and, of course, another set of contacts could actuate a separate aerial change-over relay.

Results with the transmitter have been well up to scratch. Running ten watts on /P excursions all Europe and several U.S. stations have been worked using only a dipole antenna, While at the home station, the PA HT is increased to 500 volts, giving a PA input of 25 watts to help fight through the QRM on Forty. In conclusion, the author would like to remind prospective constructors of a companion 3·5, 14 and 28 MHz unit, that a 9 MHz crystal and a 5-5·5 MHz VFO will provide coverage of the 80m. and 20m. bands at one go, and 28 MHz can be covered by using the EF183 driver as a doubler.

POINTS OF INTEREST

The Russians can now fire their smaller search-and-surveillance satellites in clusters of eight at a time. The last such discharge was put into orbit on October 14.

* * *

W9AE (La Crosse, Wis.) has a 140ft. tower. On it is a two-element beam for 40m. and a six-ele HF Tribander. The tower itself is fully insulated and can be operated as a half-wave vertical on 80m. Our low-level dipoles will just have to go!

* * *

With the current interest in planet Mars, it is perhaps worth mentioning that its radio distance from planet Earth is just 6 mins. and 43 secs.

* * *

It is satisfactory to find—from the current issue of *Region I News*, by G2BVN—that the ARRL is at last reconsidering the criteria for the DXCC award. The intention is in future to delete for credit those normally uninhabited rocks and reefs, also areas which are non-administered by any internationally recognised authority. This is a reform that has been long overdue. But it does raise a point about Rockall, recently taken under the Crown by Act of Parliament!

* * *

We congratulate Mike Matthews, G3JFF, on his promotion to the new rate of Fleet Chief, R.N.—established for specially selected Chief Petty Officers, of which he is one of the first to be promoted. He was already a Chief Radio Supervisor, the highest (NCO) rating in the R.N. communications branch. For many years a well-known worker in the cause of Amateur Radio, G3JFF is not only one of the stalwarts of the R.N. Amateur Radio Society but has also done a great deal of /MM operation—when that was still possible from H.M. Ships.

* * *

It must be a matter for general satisfaction that, at last, after six years, our ZE colleagues look to be like being brought back into the U.K. fold. The Rhodesians are of our own people and, fortunately, in terms of Amateur Radio, the 180 or so licensed ZE's have always been freely worked, and workable, from the U.K. in spite of UDI.

WE ALWAYS WANT

To see photographs of Amateur Radio interest—equipment, Club occasions, personalities and indoor or outdoor events in the radio amateur context. Payment is made, immediately on publication, for all that we can use. The preferred offering is a clear, black-and-white print, about post-card size or thereabouts, with an identification pencilled lightly on the back and full details on a *separate* sheet correlated with the picture. We would prefer *not* to be offered either colour prints, negatives, miniature cine strips or mounted transparencies—the cost of processing these to make half-tone blocks (which is what we use in the *Magazine*) is very seldom justified. Send prints that are what we want to: Editor, SHORT WAVE MAGAZINE, BUCKINGHAM.

DIGITAL AFSK OSCILLATOR

AND COMBINED RTTY SIGNAL GENERATOR

A. D. DICKSON (G8DJF), P. J. PERKINS (G3OUV)

For many readers, this will be a difficult article—because it deals with Transistory as applied to RTTY. Nevertheless, it should be carefully read because it shows—what will be obvious to many of those already on the air with radio-teletype—what is possible in the modern context by using IC (integrated circuit) units. These are now becoming freely available—they can be bought by the handful for a few shillings. RTTY is like CW without the machinery—it is the most modern way of communicating across the world on the amateur bands—and the RTTY boys who are able to do it do not have to worry about QSL's. They have the record on tape or printed page.—Editor.

THE authors' common interest in RTTY led to the realisation that an AFSK (Audio Frequency Shift Keyed) oscillator comparable in performance to their integrated circuit terminal units (the ST-6) was essential. Analogue techniques were considered, but proved impracticable. Computer analysis of the standard RTTY tone-frequencies revealed the possibilities of sophisticated digital techniques. Published circuits were unavailable, so development from first principles was necessary.

The requirements were as follows:

(*1*) Compatability with the ST-6 (to use the autostart facility to its full advantage, long and short term stability has to be maintained better than ± 100 Hz for 850 Hz shift, and ± 45 Hz for 170 Hz shift),
(*2*) High-level output, free of switching transients,
(*3*) Low cost and small size,
(*4*) Universal logic-level interfacing, for local loop or FSK,
(*5*) Little or no alignment,
(*6*) An internal "reversals" generator, for T.U. alignment,
(*7*) All components should be easily available,
(*8*) A power supply designed to operate from existing heater windings,
(*9*) Generation of standard RTTY frequencies and
(*10*) Constructional repeatability.

Two versions are described, the simpler design costing in the region of £6·00 for brand new components, and conforming to all of the above requirements but needing initial alignment. The advanced unit requires no alignment and its output frequency is "rock stable", the total cost being approximately £8·50.

Below 30 MHz it is usual to transmit RTTY as FSK (Frequency Shift Keying). This requires high transmitter and receiver stability. On VHF, where more frequency space is generally available, RTTY signals are often transmitted as AFSK (Audio Frequency Shift Keying) for medium-distance contacts, and FSK for DX working. The use of AFSK reduces the need for high transmitter and receiver stability, but is only practicable when the modulation is continuously readable. Since FSK can be generated by applying the required tone-frequencies to the audio input of an SSB transmitter, a tone-generator capable of producing stable tones with narrow-shift capability will provide a means of transmitting RTTY on the crowded HF spectrum.

Many published and commercial RTTY tone-generators use either two oscillators, with a switching circuit to select the required tone, or a single oscillator with frequency varied by switching in-and-out resistive or capacitive elements. Both designs can be unsuitable for generating RTTY tones, since an oscillator with constantly changing frequency can have poor stability; and it is difficult to ensure adequate stability of the two-tone oscillator generator, especially on the narrow (170 Hz) shift.

The tone generator described here embodies a different technique, using digital methods to produce the required tones by frequency division from a single oscillator running at a multiple of the output frequency.

Circuit Description

The block circuit diagram is shown in Fig. 1. The oscillator stage is simple and effective, using the TI SN7413N dual-NAND TTL Schmitt trigger (IC1), as an oscillator and shaping circuit. Stability of this

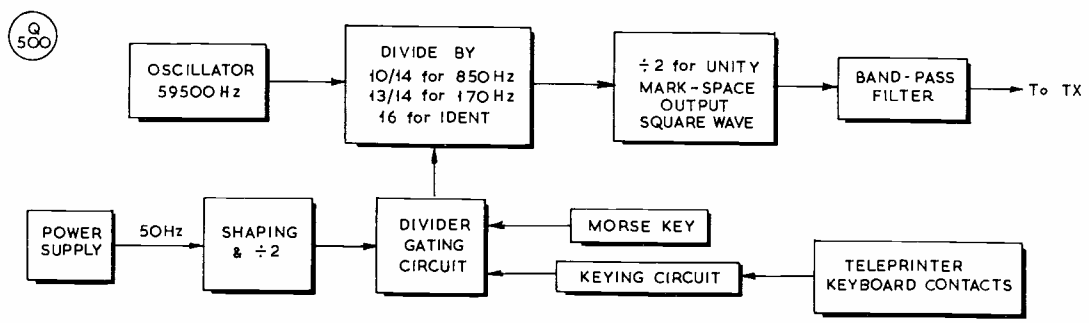


Fig.1 BLOCK SCHEMATIC DIAGRAM

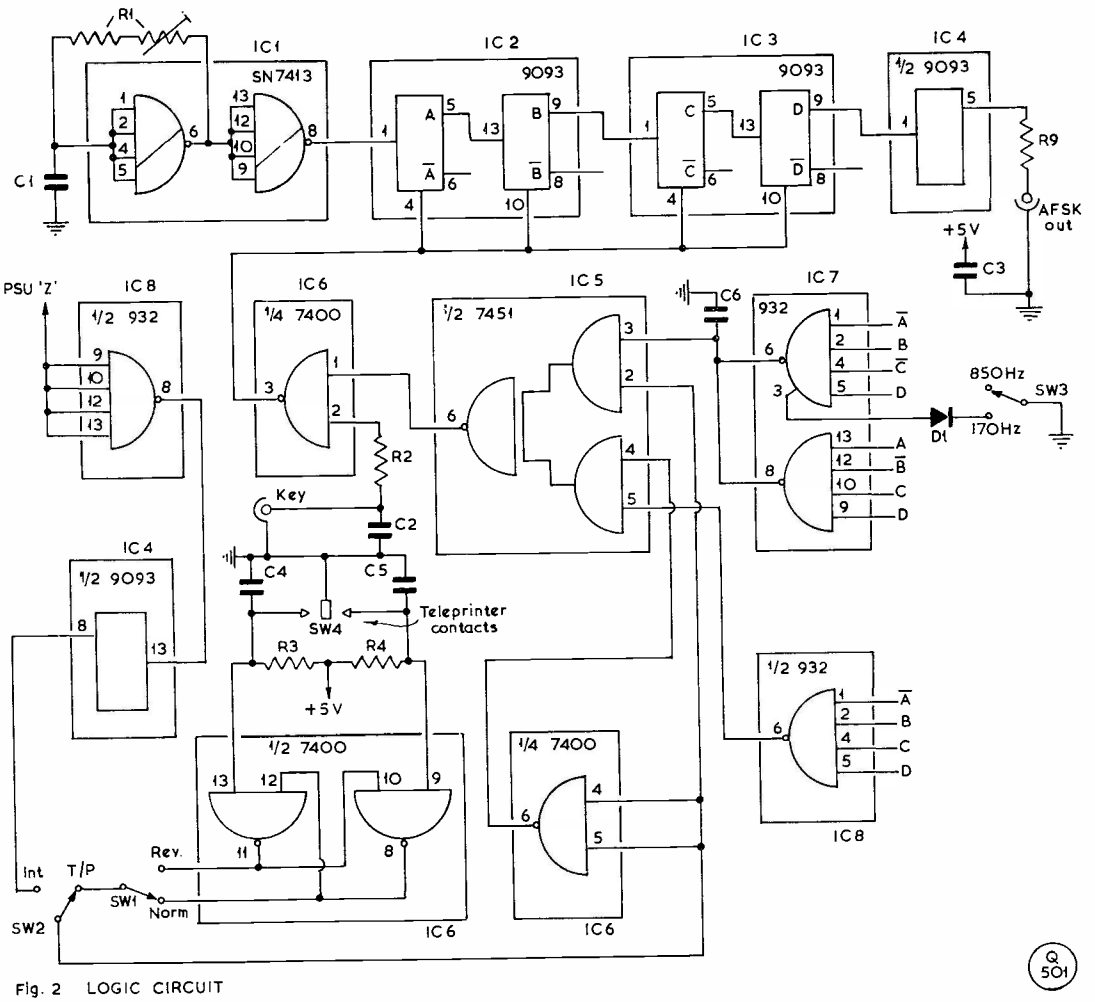


Fig. 2 LOGIC CIRCUIT

oscillator is excellent, and drift was measured to be 40 cycles per °C at constant supply voltage, giving a final output stability of 2 Hz per °C at 3 kHz. Fig. 2, the complete circuit diagram, shows the oscillator tuning arrangement (R1 and C1). For fine frequency adjustment R1 is made up of a fixed resistor of 220 ohms in series with a 100-ohm wirewound variable resistor. Coarse frequency adjustment can be effected by changing the value of C2 (increasing C2 lowers the oscillation frequency).

Frequency division is accomplished using three 9093 DTL Dual Master-Slave JK Flip-flops (IC2—IC4). Four of the flip-flops are connected to a common reset line, which is used to determine the required division ratio, and a fifth provides a final ÷ 2, to generate a symmetrical output waveform (for easy filtering).

The oscillator frequency of 59500 Hz was chosen to accommodate both 170 and 850 Hz shifts, and a different frequency for MCW identification. For 170 Hz shift, the required division ratios are *by* 26 and 28 to give

Table of Values

Fig. 2. The AFSK Oscillator and PSU

C1	= ·04 μF (*see text*)	IC1	= SN7413N
C2, C4, C5	= ·01 μF, 50v.	IC2, IC3, IC4	= SN159093N
C3, C8, C9	= 0·1 μF, 50v.	IC5	= SN7451N
C6	= ·001 μF, disc	IC6	= SN7400N
C7	= 500 μF, 15v.	IC7, IC8	= SN15932N
C10	= 500 μF, 25v.	Tr1	= TI3027, or OC35
R1	= 330 ohms (*see text*)	D1	= 1N914, or 1N4148
R2	= 100 ohms, ⅛w.	D2, D3, D4	= 1N4001, or equiv.
R3, R4	= 560 ohms, ⅛w.	ZD1	= ZF5/1 or equiv.
R5	= 220 ohms, ¼w.	ZD2, ZD3	= ZF5/6 or equiv.
R6	= 250 ohms, ½w.		
R7	= 1,000 ohms, ¼w.		
R8	= 470 ohms, ¼w.		
R9	= 1,500 ohms, ¼w.		

Note: Most advertisers offering transistors and IC units could supply all the SN, 1N and ZF items listed here as a kit. The switches SW1, SW2, SW3 are SP/CO and the fuse should be rated 250 mA.

2288·5 Hz and 2125 Hz respectively—similarly for the 850 Hz shift the division ratios are 20 and 28 to give 2975 Hz and 2125 Hz. Division by 32 will generate a 1859·5 Hz tone for an MCW ident. which will not upset the other chap's RTTY terminal unit; 59500 Hz is the lowest starting frequency that can conveniently generate both shifts, incurring a mere 3·8% error on 170 Hz shift.

The reset pulse for the divider chain is derived from the outputs of the dividers, so as to allow resetting on divisions of 10, 13, 14 or 16. A Truth Table for the divider chain (Fig. 3) gives the correct inputs to the reset gates IC7 and IC8. Since these are DTL IC's it is possible to OR the outputs of the ÷ 10 and 13 gates directly, with the ÷ 10 gate expanded to a five-input configuration by D1 to allow selection of either 170 or 850 Hz shift. C6 was included in the prototype to eliminate a possible reset hazard condition, caused by propagation delays that exist between Q and $\overline{Q}$ of all logic dividers.

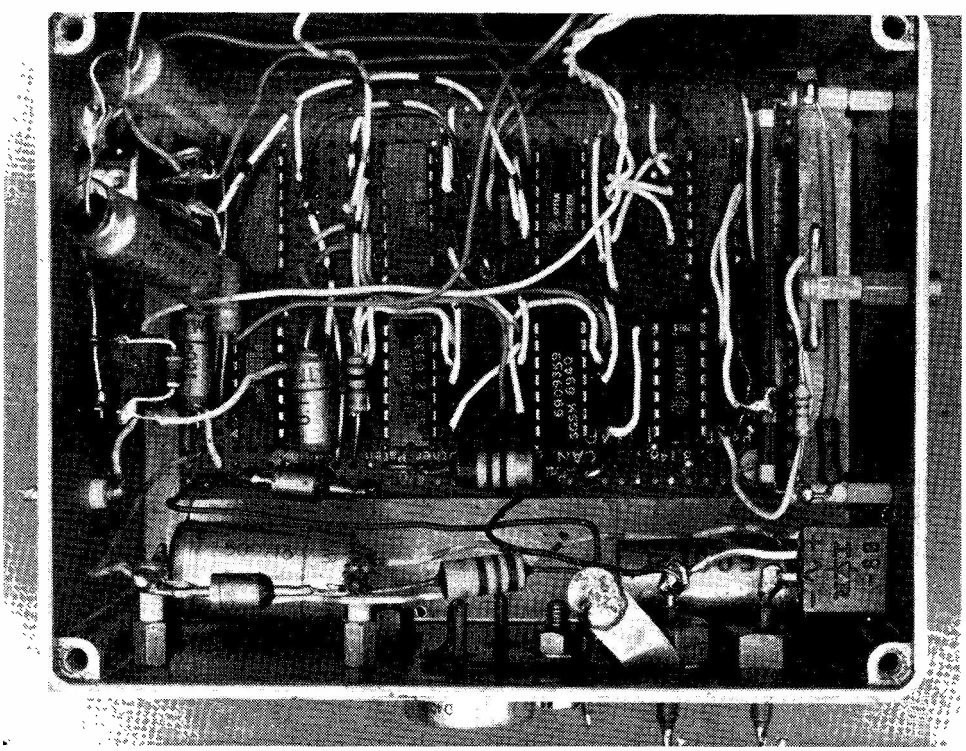
If the 170 Hz shift is selected the output of the ÷ 10 gate is held permanently at a logical 1 (+5v.) and resetting is only possible when the outputs of the ÷ 13 or 14 gates are low. On 850 Hz shift, the output of the ÷10 gate will always go low before that of the ÷13 gate, which does not have to be disabled. A further two input NAND gate (part of IC6) is used in the reset line to the dividers. Operation of the key will put a logical 1 on the reset line, and the four flip-flops IC2 and IC3 will divide by 16, giving the required frequency for the MCW ident. signal. The SN7451 (IC5), functions to inhibit either one of the reset possibilities and two of its AND inputs are driven in antiphase from the keyboard output, allowing the division ratio to be selected by the state of the teleprinter "transmit" contacts.

The information from the teleprinter contacts is signalled through a pair of cross-coupled NAND gates (part of IC6), which eliminate contact bounce. In order to retain the self-cleaning action of the contacts, an on-current of 10 mA is permitted *via* R3 and R4.

The power supply is a simple series regulator with full protection for the IC's, and produces stabilised +5v. D.C. at 120 mA and also a 5v. peak 50 Hz waveform for squaring in IC8. The squared-up 50 Hz is then divided by 2 in the remaining unused JK flip-flop IC4, to generate 50-baud reversals. This provides a unity mark-space AFSK signal which is more useful than the conventional "RY" generator for T.U. bias adjustment.

Construction

The prototype was constructed in an Eddystone die-cast box. The eight IC's were mounted symmetrically on a piece of 0·1 in. matrix *Veroboard* 3¾ x 2½ in., with the tracks broken to give each IC a pin connection, two wiring holes and a space between adjacent devices. All remaining tracks were left unbroken for supply lines and the common reset line. Adequate decoupling is provided by the 0·1 μF paper capacitor C3, mounted directly on



Layout inside the Audio Frequency Shift Keyed Oscillator, using IC pieces.

General view of the AFSK Oscillator and RTTY Signal Generator.

the board. The completed board was fitted up on metal spacers, with sufficient track broken in the vicinity of the mountings, as the case is at earth potential.

Since all switches are mounted on the lid of the box, is is advisable to leave long colour-coded wires for the flying connections.

COUNT	OUTPUT			
	A	B	C	D
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

Fig 3 Truth Table for IC2 and IC3 Q 502

The prototype also had a logic-level output for local copy, this being taken directly from the output of the cross-coupled gates. The tuning resistor (part of R1) was mounted on stand-off insulators on the side of the box nearest to the SN7413N—the value of this resistor can be lowered "on test" for easy tuning, and it is advisable to make the fixed part of R1 accessible when the board is mounted in the box.

The complete PSU (except for the transformer) was constructed on one side of the box, using stand-off

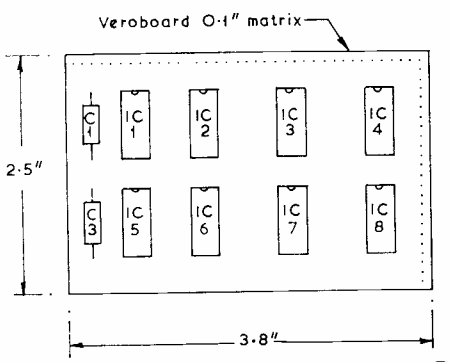


Fig. 4 Board Layout Q 503

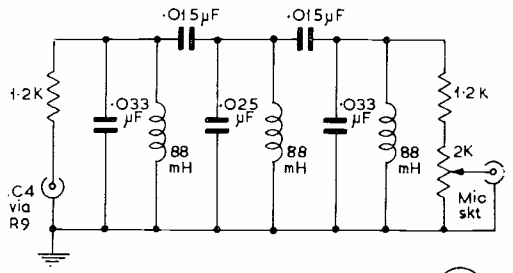
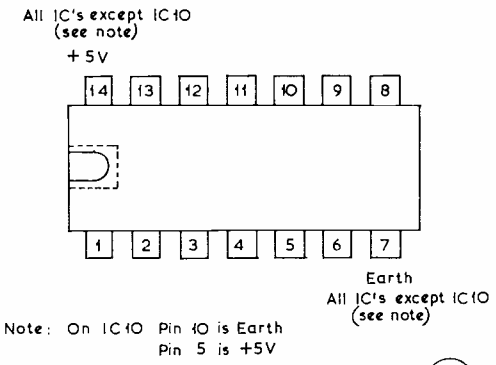


Fig. 5 ST-6 Bandpass Filter

Q 504



Note: On IC10 Pin 10 is Earth
Pin 5 is +5V

Fig 7 14 Pin D.I.L. Integrated Circuit

Q 506

insulators. The series transistor Tr1 is isolated from the box by a mica washer, silicon grease being used to ensure good thermal conductivity with the box, which acts as a heat sink. All external connections were decoupled to RF at their point of entry, as the dividers are capable of operation up to nearly 20 MHz. In the prototype, a miniature jack was used for AFSK output, and a 6-pin DIN socket for keyboard and key connections, as they were "junk box" components.

Setting Up and Operation

Before any power is applied to the board, it is essential to verify that the PSU output is between 4·75 and 5·25v. with a load of 100 mA—that is, 50 ohms at ½-watt. As IC's are expensive and damaged ones are difficult to remove from the board, check their orientation and ensure that there is *no* connection between adjacent *Veroboard* tracks, especially where the track has been broken.

Monitoring the PSU current, apply 5 volts to the board. Typical consumption will be in the region of 120 mA. With the aid of a digital frequency counter setting up the oscillator is much simplified.

Monitoring the signal at pin 8 of IC1, adjust R1 for 59500 Hz. Failing this, couple loosely (50 $\mu\mu$F) the output of IC1 (pin 8) to a receiver, and measure the frequency separation of the harmonics, R1 being again adjusted for 59500 Hz spacing. Although harmonics will be audible up to many Megahertz, it is advisable to work at the lowest possible frequency and check that markers are on either side of a selected frequency, to obviate image reception.

No other alignment is necessary, and if all the wiring has been completed correctly, the unit will function as described. Before applying the square wave AFSK output to any transmitter, it is essential that an effective band-pass filter be connected between the generator and modulator. This was not built into the prototype since stations already transmitting AFSK will have a suitable band-pass filter.

For the amateur station getting started on RTTY a good filter is essential, and this will no doubt be used both on "transmit" and "receive". Many excellent filter designs have been published, and a very successful specimen is shown in Fig. 5. (This is part of the ST-6 TU, designed by W6FFC.)

A final word of warning must be included which applies to all AFSK generators: In AM service the modulator should be rated for C.C.S. and not I.C.A.S. Most *ex*-commercial radio-telephones (as used by many newcomers to VHF) are incapable of 100% modulation, let alone continuous service. It would be advisable to enlist the use of an oscilloscope to check the modulation level which gives maximum undistorted output. This warning also applies to SSB transmitters, where the maximum inserted carrier rating must not be exceeded.

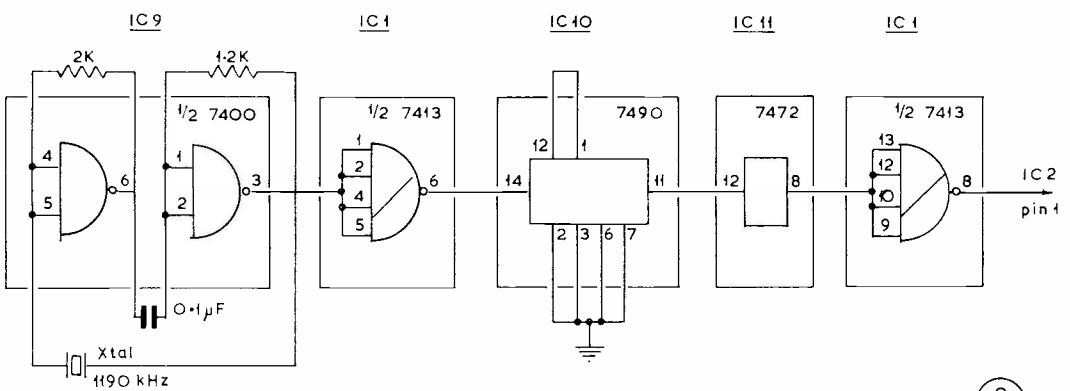
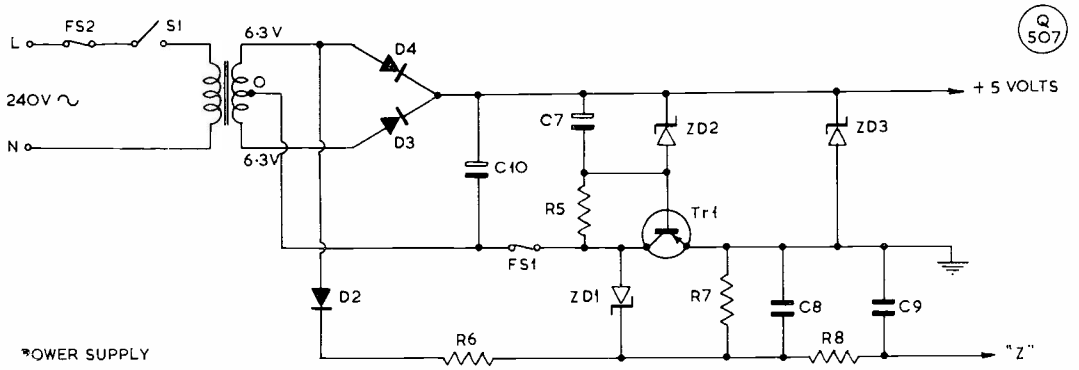


Fig. 6 Crystal Control Version

Q 505



Conclusions

To date four units of design outlined here have been successfully constructed, all of which worked first time. A fifth generator has recently been completed which requires no alignment, and could be considered the last word in AFSK generation. This design requires only three extra IC's, and is shown in Fig. 6. The free-running components R1 and C1 are removed, this half of the Schmitt being used to shape the 1190 kHz output of the cross-coupled gate xtal oscillator, using half of a SN7400. Further division x 20 is required, and is given by an SN7490 (÷10) and an SN7472 (÷2), these extra IC's being mounted with the crystal on a separate piece of *Veroboard*.

THE RF AMMETER AND RADIATED POWER

USE OF THERMO-COUPLE INSTRUMENTS IN SIMPLE CALCULATIONS

F. G. RAYER, A.I.E.R.E. (G3OGR)

TIME was when an RF ammeter was often shown in the aerial circuit from a transmitter or tuner, and was included as a matter of course in various ex-Service transmitters. But now it is less favoured and is often omitted, frequently because a SWR meter is present elsewhere instead. While the use of these indicators is dissimilar, in one respect they can have like uses:

SWR Meter: When forward power is maximum and reflected power minimum, it is assumed maximum energy is being supplied to the aerial and radiated.

RF Ammeter: When this shows maximum current, it is assumed maximum energy is supplied to the aerial and radiated.

Within limits these assumptions are true, but even if a SWR meter is present, the RF ammeter can have its uses. In the same way, the use of an RF ammeter does not mean the SWR meter is not desirable as well, in many circuits.

The usual thermo-couple meter (RF ammeter or HF ammeter) has a thermo-couple of dissimilar metals, heated by the passage of RF current, and in turn supplying a small DC output which goes to a milliammeter. The scale is not linear, as with a DC milliammeter, but is cramped at the zero end. Markings differ somewhat, but the first scale marking of a 350 mA RF ammeter may be 50 mA or 100 mA, and there may be little indication at currents much under 100 mA. In the same way, a 2-amp. instrument meter may have a first marking of 0·3A to 0·5A. The resistance of a typical 350 mA meter could be 1·6 ohm, and that of a 2A meter, 0·12 ohm.

Output Power

The RF ammeter only allows an actual power reading when the transmitter is working into a resistive load of some known value. The meter is then put in one lead, Fig. 1, and the power in watts equals I^2R—I being current in amperes, and R (or Z) the resistance or impedance. For 75 ohm and 50 ohm loads, the RF power into the load is as follows:

	Power	
Meter Reading.	75-ohm Load	50-ohm Load
0·1 A	0·75 watts	0·5 watts
0·2 A	3·0 ,,	2·0 ,,
0·3 A	6·75 ,,	4·5 ,,
0·4 A	12·0 ,,	8·0 ,,
0·5 A	18·75 ,,	12·5 ,,
0·6 A	27·0 ,,	18·0 ,,
0·7 A	39·75 ,,	24·5 ,,
0·8 A	48·0 ,,	32·0 ,,
0·9 A	60·75 ,,	40·5 ,,
1·0 A	75·0 ,,	50·0 ,,

Since doubling the current increases the power by four, even a relatively small increase in current may represent a worthwhile increase in power. This also applies when working into an unknown load (as an aerial).

Power lost in the ammeter itself is also I^2R. As example 1 x 1 x 0·12 = 0·12 watt, for a current of 1A through the meter having a resistance of 0·12 ohm. These losses are so small that the meter is usually left

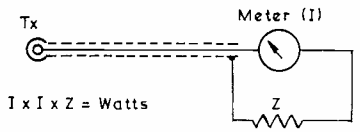


Fig.1 Calculating RF Power with the Meter

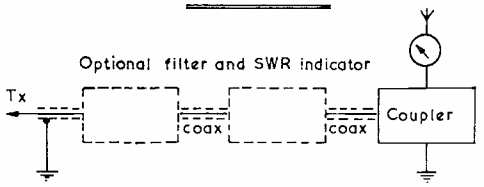


Fig.2 Position of Meter with End-fed aerial

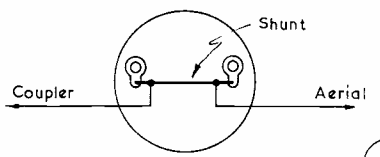


Fig.3 Shunt to protect meter

in circuit.

For transmitter tests, Z in Fig. 1 can be a large carbon resistor as used for RF loads, or for low power, two or more 2-watt carbon resistors in series or parallel. As example, two 150-ohm 2w. resistors in parallel would be 75 ohms, and take up to 4 watts.

If an AM transmitter is modulated by a *sine wave* carrier power increases by 1·5 over the unmodulated level. Meter current will thus increase by 22% for nearly 100% modulation, or 18% for about 90% modulation. In tests with *sine wave* modulation such an increase should be seen. In normal usage with voice modulation, the ammeter will show nothing approaching such an increase, but only small rises during speech.

Use With Aerial

Fig. 2 shows the use of the RF ammeter with an end-fed aerial. A 75-ohm or other co-axial lead from the transmitter may have an appropriate harmonic filter, or SWR indicator, or both. The coax circuit terminates in a Z-Match, Tuner, Coupler, Roller-Coaster, Xobknuj Reactor or other device used to feed the aerial. The RF ammeter is in the aerial lead.

If no changes are made to the actual aerial-earth system, maximum ammeter current indicates maximum radiation, so coupler adjustment or tuning is directed towards securing this. If coupler adjustments are to obtain the lowest reflected power, as shown by a SWR indicator, this setting can often *agree* with maximum radiated power. But if the coupler has unfavourable values of inductance, capacitance and coupling, it is possible to tune in such a way that the minimum SWR does not coincide with maximum RF into the aerial. If so, tappings, etc. in the coupler should be changed, and the circuit re-tuned.

Ammeter readings are comparative only, and will change with alterations in frequency. Changes will usually be large when moving from one band to another. As example, an end-fed wire could be a $\frac{1}{4}$-wave (low impedance) on 160m., and a $\frac{1}{2}$-wave (high impedance) on 80m., so that in these circumstances a small Top Band Tx will result in a larger aerial current than a more powerful 80m. transmitter.

It may well be found that with some PA operating conditions, maximum RF ammeter current does not agree with the PA tuning dip, or usual maximum PA DC input. RF output may actually begin to fall off during the last stages of PA loading and tuning. If so, the PA may have unsuitable grid drive, bias, SG voltage, anode voltage, or incorrect *pi*-tank constants. All adjustments should be directed towards increasing ammeter readings.

Changes to the aerial or earth system which increase RF ammeter readings by no means indicate an increase in radiated signal strength. As example, adding a counterpoise earth would generally boost meter readings because the aerial-earth system is then of lower impedance. For the *same power*, current must then increase, since power is I^2R.

The meter can be put in a co-axial line to a dipole, and if the SWR is very low, anticipated current may be estimated from the Table p.675. With an appreciable SWR, current will be smaller or larger than expected, depending whether the meter falls near a voltage or current loop.

Usage with Zepp or other tuned or open-wire feeders is similar to Fig. 2. One meter may be put in each line, but though currents should be about equal with a doublet, they will not exactly match with a Zepp aerial.

Shunts

When meter readings are comparative only, it is practicable to shunt the RF ammeter if readings are too high. Usually, a short copper wire directly across the back terminals or prongs will do well, the gauge being chosen for the wanted effect.

The shunt should be soldered on, or rigidly connected. If excess current is passed through the meter, the thermo-couple will be destroyed.

Fig. 3 shows a method of connecting a shunt. It is soldered to the meter prongs, or to tags fixed with nuts. Leads to the meter are soldered *to the shunt*. The deflection can be reduced by moving one lead nearer the other, and re-soldering. If one end of the shunt comes adrift from the meter, the meter is left disconnected, and does not have to carry the current unshunted.

Editorial Note: Some very useful and instructive bench tests can be carried out using the circuit of Fig. 1. Provided the meter itself is reasonably accurate and the resistor Z (or R) of a known value within very small limits, the actual RF output of which the transmitter is capable can be determined. Knowing the DC input to the PA, the Tx efficiency can be calculated in terms of power-out for power-in, band to band. If the aerial, as a load, is truly resonant, *e.g.*, a dipole with a known feeder impedance (usually either 50 or 75 ohms in the case of coax line) then the RF power going into the aerial on a given band can be assumed to be the value obtained by Fig. 1.

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SHORT WAVE LISTENER FEATURE

By Justin Cooper

LOOKING AT THE MAIL—
—PRACTICAL NOTES ABOUT ANTENNAE—
POINTS RAISED AND QUERIES ANSWERED—
COMMENTS OF INTEREST

AS this comes to be read, it will be the season traditionally given over to New Year Resolutions. This time, J.C. and G3KFE of "another place" were having a quiet pint, as we do on the occasions we can get together, and for this year at least, G3KFE agreed to let J.C. offer his own resolutions instead of hogging the subject in CDXN.

The onlooker sees most of the game, it is said. In this game, that is very true. But many of our SWL "onlookers" make their work far too hard. Many also will condemn any aspect of radio in which they are not personally interested. Many more will criticise amateurs they hear as "lids" with never a thought of the hundred possible reasons for it. Both G3KFE and J.C. have received many letters condemning this-and-that—but *never* a letter trying to see the other guy's point of view, or to exonerate him from blame.

Heaven help us, there are enough angry people about (including SWL's!), who need to take time off from their various activities just to sit down quietly and *try* to understand the other man's position and motives *truthfully*—and if they are at all honest, they must come to the conclusion that there is no "right" or "wrong" side, but only degrees of rightness (or wrongness) on both sides. All of which adds up to the fact that you don't find it needs rude words like "lid" but rather the hand of friendship. Friendship is a thing radio amateurs were famed for till just a few years ago—and they ought to be famed for it again, particularly in the competitive aspects of our hobby.

The Mail

And the start of this part of our offering is as good a place as any to thank all those correspondents who sent their greetings, and to wish them all a Happy and Prosperous New Year.

Next we come to those new to this feature: *P. L. Newman* (*Thame*) used to be keen in his early days, but was keener on the social life of a youngster. Now, ten years later, he has taken it all up again, with a BC-348R, end-fed wire in the spare room and VHF converter. It is intended, as the rig is gradually finalised, to add a 21 MHz converter, an ATU, and an aerial for 144 MHz, which looks as if it will be a beam up in the loft. But progress is slow, and likely to continue so, with chemistry final-year work to be completed and R.A.E. to follow next season.

R. Jones (*Caerphilly*) runs an Eddystone EC-10 Mk. I to a hundred feet of wire, but plans to get an RD-5 aerial at Christmas, to make the best of limited listening time—at the moment, A-Level studies and homework are the order of the day.

A. Rowland (*BFPO 53*) has an interesting first list, and a string of queries. To the first one: Many countries, where the number in the prefix indicates location, use as an indication of "alternative address" operation the number of the call area in which operation is taking place. For instance, W1BB/1 is at his alternative or portable station site in the first W call area. If he were signing W1BB/6, he would be in California, and so on. Whence ZL2UP/2 is out somewhere in the second ZL district. DA is a German call prefix; "U3UP" was almost surely a case of the slurred-callsign effect!—one would think probably a UA.

Cray Valley is a hotbed of SWL and Club activity, *O. L. Cross* (*Bexleyheath*) assures us, accounting for the accuracy in presentation of his list. Here the Rx is an Eddystone 840A, a VHF converter for which an 8·25 MHz crystal is needed, a 150-foot long wire, and an inverted-Vee for 21 MHz, although Eighty seems to be his favourite hunting-ground.

Hard luck for *C. Witts* (*Gloucester*) if there is a local fire when the DX is rolling in—he has to do his duty as a full-time fireman. On the other hand, it does give an opportunity to listen-in at times when most people are asleep or at the "salt mine." Chris has a JR-500S and a Lafayette KT-320, to which is tacked a full-size "5RV" aerial.

It's an ill wind that blows nobody any good, muses *N. Bingham* (*Carrickfergus, Co. Antrim*), who blames his present burst of activity to a thrombosis. It seems that when he got back to the "pottering" stage of activity, frustrations were worked off on an old R.1155, the first logging on it being exactly eight weeks after being carted off to hospital. However, the result is that his sons have just about taken the Rx over, except for fault diagnosis, which Dad is given as his parcel! A very brief note from *A. West* (*Herne Hill, London, S.E.23*) offering his first entry for the Ladder; he is running a Trio 9R-59DS with a 132-foot wire, end-fed.

G8ERM is in trouble—Mum has taken over the AR-88D and 132-foot aerial, plus FET converter and 8-el beam for Two, to put in a list. As said G8ERM is hon. secretary of *Nuneaton* Club, *Ruth Smith* is under considerable pressure from the locals to progress beyond just listening—and why not, indeed. Your old J.C. has met quite a few Mums with callsigns, *e.g.*, G3XVC, G3YEB and G3LWY, to name just three. And it is a pleasure to have three YL's on the Ladder—we wish more would "have a go!"

Just one minor boob appears in the list from *S. Clark* (*Charterhouse*) in that Stuart logged "ZB9BM" for—almost certainly—ZD9BM. An easy enough slip, in all conscience, on Twenty with all the QRM about. More of a worry, from Stuart's point of view, is the thought

of having to return to Australia when the OM is posted home, in that he will have to start the long climb up the Ladder over again.

G. Ridgeway (*Basildon*) uses a Trio 9R-59DS plus a Joystick, as there is an embargo on outside aerials where he is. One would think the local licensed chaps have found a way to get round the problem, as have those in just about every New Town where this rule is applied. In general, the method is to write in, indicating how it is proposed to erect the aerial, stressing that it is in connection with Amateur Radio operation, and that no damage to the building is possible or unsightliness intended. Your conductor has lived in two New Towns, and has always managed. G3RKJ in Harlow did not make WAC on Top Band with an indoor aerial, and there are others with TA-32's and similar beams in Harlow.

Another hotbed of activity seems to be *Hitchin*, and one of the local lads is *M. Kitchener*, who has for three years past used an SR-150, but changed recently to a Trio 9R-59DS. General-coverage is essential at the Kitchener establishment—for the cricket commentaries when Tests are being played abroad. Mick is doubtful about the status of AC3PT, heard on Eighty one evening being treated with some reserve by many people, although a few dived in and worked him. To the best of J.C.'s knowledge, Namu is mainly on Twenty, so it is possible the station heard on Eighty was spurious.

DX-TV Note

Quite a few people have mentioned the reception of DX television signals as an interest over the years; these readers may be interested to hear of a club called the "European Testcard Hunters" whose members are mainly in the Benelux countries, but they aim to expand membership if possible in U.K.—if enough chaps become members an English-language newsletter will be practical—they are aiming to put one out in various languages. Those interested should write for details to P. D. Van der Kramer, European Testcard Hunters, P.O. Box 2027, Den Bosch 4004, Netherlands. If you want to take out a sub. straight away, send £1·25 with your letter—though because of charges it will be £1·50 if you do it through the Bank. We hope this venture, which is long overdue, has every success, and commend it to any SWL members of BATC as well.

Talking of clubs, *M. Williams* (*Sleaford*) says the proposal for a club at Grantham is stymied for lack of "someone to take charge." If that's all you need to get off the ground, Maurice, do it *yourself!*

Matters Technical

J. R. Cowan (*Rochford*) wants to know what aerial is best for reception. A difficult question, particularly as John wants general coverage. One would think probably the answer to this one would be either an end-fed as high as possible with a good earth—radials, waterpipe, old chassis or watertanks buried, all connected to one another by good joints, and coupled to the receiver by a good ATU. If a centre-feed arrangement is more convenient on the plot you are on, then use a centre-fed arrangement of suitable length as high as may be for the flat-top, connecting at the centre by means of open-wire feeders, and using an ATU at the receiver end. The point here is that feeder losses due to a high VSWR on the feeder are negligible *provided* the mismatch is tuned out at the ATU. When people talk of "losses due to high VSWR," they usually mean not matching to whatever impedance the feeder offers at the bottom end—a vastly different thing, of course.

A ground-mounted trapped vertical is praised by *J. Woods* (*Woodbridge*) as a DX aerial, compared with a trap dipole. He uses eight-foot earth stakes at the end of each radial—care at the earth end being the main thing.

A domestic disaster, when the boiler sprang a leak, was turned to advantage by *R. Carter* (*Blackburn*) who now has his house all-electric, and has buried the thirty-four feet of copper piping thus made redundant as an improvement to the station.

A problem that often puzzles people has worried *J. W. Jarvis* (*Rickmansworth*). He recently bought a JR-310 receiver new, and is somewhat alarmed to find that there are redundant holes which apparently ought to contain capacitors, and a screen attached to the earthing thumbscrew, none of which are mentioned in the handbook. Not surprising, really, you know; there is always a little bit of small print which mentions the manufacturer's "right to change without notice." What it really means is that, for instance, some maker offers a capacitor which is better and cheaper than the one embodied, so a change is made, and tests show this to make another one redundant. However, this *never*

HPX LADDER

(All-Time post war)

SWL	PREFIXES
PHONE ONLY	
S. Foster (Lincoln)	1257
J. Singleton (Hull)	1115
A. W. Nielson (Glasgow)	1093
R. Shilvock (Lye)	1080
J. Fitzgerald (Gt. Missenden)	959
I. Brown (Newtownabbey)	905
G. S. Taylor (Rugeley)	892
T. Rootsey (Ilford)	844
R. Carter (Blackburn)	828
M. T. Hyder (Southampton)	824
K. Kyezor (Perivale)	819
N. Henbrey (Northiam)	819
M. J. Quintin (Wotton-under-Edge)	815
D. Rodgers (Bolton)	808
J. G. Ayton (Sunderland)	802
W. Moncrieff (Hampton)	789
A. Mercer (Wigan)	788
M. Fisher (Bradford)	767
S. Proud (Letterston)	762
H. Alford (Burnham-on-Sea)	755
J. P. Scragg (Stockport, Cheshire)	755
B. Hughes (Worcester)	736
T. W. Hyder (Southampton)	708
H. M. Graham (Harefield)	690
M. Williams (Sleaford)	689
E. Parker (Hove)	664
P. L. King (Isle of Wight)	662
E. W. Robinson (Bury St. Edmunds)	660
D. Robinson (Birmingham)	642
A. Holland (Malvern)	641
G. W. Raven (London, S.E.13)	633

SWL	PREFIXES
PHONE ONLY	
N. Askew (Coventry)	624
J. H. Sparkes (Trowbridge)	602
A. Judge (Bishops Stortford)	601
S. Wessely (Sheffield)	591
Mrs. S. Singleton (Hull)	582
D. A. Shepherd (Brierley Hill)	563
R. Pepper (Bradford)	562
J. R. Cowan (Rochford)	550
K. C. Webb (Reading)	550
J. Dunnett (Luton)	535
P. Harris (Surbiton)	533
D. J. Browning (Bishops Stortford)	533
R. Bence (Cardiff)	532
T. George (Penzance)	511
J. Woods (Woodbridge)	507
CW ONLY	
A. Glass (Plymouth)	758
J. Dunnett (Luton)	669
G. Proud (Letterston)	602
H. Wright (Pontefract)	495
W. B. Taunton (Meopham)	438
J. Halden (Newcastle, Staffs.)	429
T. Grimbleby (R.A.F., Digby)	305
R. Mortimore (Cardiff)	301
D. Rodgers (Harwood)	261
T. Thornton (Wargrave)	238
A. Rowland (BFPO 53)	218
T. George (Penzance)	207

Starting score, 500 for Phone, 200 for CW. Listings include only recent claims. Rules for HPX, as given in the November issue. The DX Zone Map, and latest Prefix List, 85p, post free, from Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, SW1H-OHF.

The SWL station now being operated by Chris Cooper, 11 Cyprus Terrace, Garforth, near Leeds, Yorkshire, where he has as receivers an RA-1 and FR-100B, with solid-state modules for two metres, together with a K.W. E-Zee Match for aerial tuning. The antennae consist of a halo and 8/8 for two metres, a Mosley TD-3Jr. for 10-15-20m., and a trapped inverted-Vee for all-band coverage. On the wall is the enlargement of a photograph (taken at the time by Chris himself) of the Duke of Edinburgh talking to G6FO, Editor of "Short Wave Magazine" at the 1966 Amateur Radio Exhibition.

happens in between production batches, so lots of sets have some unwanted holes in the printed boards; indeed an engineer may decide to keep the holes for ever, "just in case" rather than spend good money changing the drawings and artwork for the board and the screen-printing when it's cheaper to keep the hole. As for a screen, it is probably a matter of Murphy's Law; after a hundred sets have been made, and sold, the next batch comes down to test and every one "hoots." The design engineer comes rushing down to the production test area, satisfies himself a screen will do the trick, sketches it out on the back of an envelope as a "bodge" which the works can make to get production going again, the while the engineer and the drawing-office try and think up a more elegant answer in time for the following batch. But at no time must the production stop, or people have to be "laid off," factories shut down, and all the rest of the business. And, of course, the handbook is *never* right up to date. Don't blame Trio, or the importer; they are doing their best to see you get a box which meets the specification, as does any manufacturer worth his salt.

How to make the traps in a trap dipole? Thus *D. A. Shepherd* (*Kingswinford*), who knows the resonant frequency to be near 7 MHz. The W3DZZ version uses 60 pF in parallel with an air-spaced coil, mounted around a ceramic insulator, grid-dipped to 7 MHz, with the inner sections of wire 32 feet and outers 22 feet long. Use transmitter-type ceramic capacitors for the traps, and a coil which grid-dips to 7 MHz when tacked across the C, Compressing or opening the spacing between turns as necessary to get it just right; the L/C ratio of the tuned circuit does not really matter for the operation of the circuit, but it will have a marked effect on the outer section length. High C results in a longer outer section, low-C shorter, but of course if any deviations are made from the figures given the aerial must be adjusted to get the right VSWR on each band. Properly done, it will show better than 2 : 1 on 14-21-28 MHz, reasonable on Forty and Eighty and less than 2 : 1 at resonance on these latter bands. The whole works should be fed with co-axial cable, preferably *via* some sort of balun. A practical hint is to use the collar part out of a heavy-duty strip connector to fit the trap to the wires; and a polythene bottle can be made to act as a weather-proof enclosure for the trap.

Prefixes

As always, there are some questions to answer and some points made. *J. Dunnett* (*Leighton Buzzard*), after mentioning that he is about to be posted—again!—this time to Mons, in ON land, offers a great big question-mark in the form of a VQ8DD—but 3B is the prefix for Mauritius these days. One wonders. The next one is the whereabouts of SVØWXX—answer Crete, and QSL *via* W3HNK.

K. Webb (*Earley*) mentions the new prefixes such as IH from Italian off-shore islands—IH is Pantelleria, well-known to men of all three Services at one stage or another of Mediterranean warfare.

M. Marsden (*Ilford*) has heard U5ARTEK and wonders about him—quite OK, but the story behind the call is rather too long to tell here. OB6JI was a special call from Peru.

Those UK's have got *T. Ellis* (*Frensham*) worried—the Russian UK calls are *all* club stations, the actual callsign being in accordance with a complex system which identifies its location pretty accurately—for instance, UK2BBB is in Lithuania. One presumes this recent alteration in the prefixing of Russian stations is the result of running short, in some areas, of calls to allocate in the existing series—the club, of course, plays a much more

important part in their licensing system than it does in most other countries.

On to *K. A. Hastie* (*Jedburgh*), who questions OMØBFH and 4NØDX, the former being an OK in disguise, and the latter a station in YU on specially for the *CQ* WW Phone Contest in the multi-operator category.

S. Foster (*Lincoln*) mentions quite a few oddities in the line of prefixes, including CV8 and CV9, used by some CX stations in the contest; XX6 and XX7, from CR6 and CR7 lands respectively; YNØ used by some YN1's in the contest; 4C1 and 6D1, both from XE, also for the contest, 9I7 instead of 9J2 during the last week of October; XU1AA as a *genuine* XU, all the odd W/K variants of the last few months; and finally a real collector's piece in the shape of EP1JY/AM—JY1 himself, flying from EP to JY.

A final one is a deletion—*R. Holland* (*Malvern*) claimed a GI7—there are none such! About the only G7 your J.C. can recall is a long time ago—about 1956, in connection with, memory suggests, a long-distance ballooning expedition, or something of the sort.

Miscellany

On December 15, *K. Plumridge* (*Southampton*) was married, so no doubt he will be slowing up in HPX and radio activities but speeding-up his work with a paint-brush! Our congratulations and best wishes for the future to both.

Oh dear! We boobed! *S. Rawlings* (*Twyford*) rightly complains that we misquoted his new callsign—he is G4ALG but we made it out as "G4ALT"—sorry, Stephen.

A. Mercer (*Wigan*) re-read the Rules of HPX last time round, and as a result goes up by a fat factor in the listings. (Reminds one of the label on a bit of electronic lab. test-gear received not so long ago; tied to one of the knobs was a card that said in red letters "If all else fails, read the instructions").

E. Parker (*Hove*) has unprintable things to say of Forty and the commercial pests that intrude; but he has to admit there *is* DX under it all.

S. Cole (*Newport, Mon.*) seems to have come a long way since he first wrote in years ago, and he is now at the waiting stage—he took the December R.A.E.; and if he passes can be proud of himself because it was all done on his own, the nearest R.A.E. class being too far away. Immediately after the R.A.E. he will have started his CW practice, so as not to lose time in getting his G4 call if the exam is OK—and if he fails, Stephen reasons he won't have lost anything, and will have gained a place on the CW HPX Ladder. We will be watching with interest.

R. Philpot (*Shenfield*) heard JY2/AM over the Med., and wonders what sort of aerial she could have been using. Most aircraft aerials for communications are in the form of a slot in the skin, and the ILS aerials may be the same; SSR aerials are often in the form of a Bermudan sail with the "boom" at the skin of the aircraft and the "mast" at the trailing edge—this is to give resonance at the two frequencies, transmit and receive, and also to improve the aerodynamic shape of the little aerial. One must assume any /AM station is using the installed aerials; it is highly unlikely that an impromptu skywire would get past the authorities at either end!

P. L. King (*Isle of Wight*) writes from Singapore, where he is working for a few weeks, to offer a *Nil* in HPX—not because there aren't any to record, but that he didn't have time to finish his paperwork before he packed his bag. No matter, he'll be back home soon!

For *H. Alford* (*Burnham-on-Sea*) a thought has livened the month. He reckons it would be an enormous advantage to be able to speak foreign languages, so as to improve one's HPX total—yes, agreed, but just think that there are people talking the sort of drivel one hears on Eighty in English, in all the other languages. But it would certainly help a DX operator trying to get a QSO with a station using his own language to foil the pile-up, and it would help even more to be able to make a simple QSO in the foreign language. The *Ham's Interpreter* is a good way to make a start—*see* review p.471, October issue, SHORT WAVE MAGAZINE.

P. Harris (*Surbiton*) is a little upset about the ones that got away, since he is at the moment of writing sweating away on the last run-up to the R.A.E. Let us hope he makes the pass grade, after such self-sacrifice!

R. Pepper (*Cullingworth*) has much to say from both sides about the Jamboree-on-the-Air event and what it means. He was, of course referring to his own village Scouts, who have just moved into the Hq. it has taken them five years to raise the money for; they had the Northern Heights Club, signing G2SU/A, as their representative on the air.

Another one to mention J-O-T-A was *M. J. B. Shields* (*Abergavenny*) who tuned round Ten during the event, using a seventy-foot end-fed without earth or ATU to a Trio JR-500SE. Most of the 23 countries he logged were more or less North-South, as one would have expected at this time in the sunspot cycle, but there were some Caribbean countries, W6, and Russians.

Sea angling is another interest with *W. B. Taunton* (*Meopham, Kent*) who likens the behaviour of gulls diving into the sea for a shoal of fish to the rat-race that is Eighty at the DX end.

Now to *Irwin Brown* (*Newtownabbey*) who has an amusing bit in his letter this time discussing his method of getting from outside the shack window to earth; seems it involved putting a bit of wood into one end of a drain, with a light line attached, and floating it past a trap and a right-angled bend until it eventually emerged on the railway track where it could be taken down to ground; by this means his earth lead was actually taken underground without digging. Neat!

Not many new prefixes for *J. H. Sparkes* (*Trowbridge*) this time, due to such other activities as taking railway photographs; but one very interesting one heard was a chap on an Atlantic Weather Ship discussing the measurements they have to take and how they are taken.

A. Judge (*Bishops Stortford*) is still a wee bit of a Top Band addict, with ten countries up on SSB and ten on CW, all Europeans, and plans for the real DX this winter being stewed up. "Shortages" in the country list so far include OH, OE, and Jersey—for the latter look out for GC2LU.

N. Henbrey (*Northiam*) says son David is off to the University of Southampton on an electronic engineering course, but as yet has not found much time for SWL.

NEW HPX LADDER

(Starting January 1, 1971)

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY		*PHONE ONLY*	
K. Plumridge (Southampton)	479	H. Stephenson (Newcastle-on-Tyne)	291
W. B. Taunton (Meopham)	478	Z. Parmigniani (Stockport, Cheshire)	265
P. Goff (Towcester)	432	G. Ridgway (Basildon)	261
Rev. L. J. Turner (Dudley)	428	O. L. Cross (Bexleyheath)	255
J. V. Parker (Newcastle-on-Tyne)	424	M. Kitchener (Hitchin)	255
J. W. Jarvis (Rickmansworth)	423	P. Reeves (Burton-on-Trent)	252
S. Rawlings (Twyford)	386	R. Impey (Brentwood)	252
M. Marsden (Ilford)	360	M. Wayland (Leicester)	240
H. R. Goodwin (Streetly)	356	W. & J. Bingham (Carrickfergus)	230
Miss L. Hyder (Southampton)	353	P. N. Newman (Thame)	229
J. Iredale (Llandudno)	340	J. Gravell (Burry Port)	228
R. Philpot (Shenfield)	313	S. Clark (Charterhouse)	211
K. A. Hastie (Jedburgh)	303	R. Jones (Caerphilly)	207
Mrs. R. Smith (Nuneaton)	300	A. West (Herne Hill)	205
T. Thornton (Wargrave)	295	C. Witts (Gloucester)	201

Listings include only recent claims. Starting score 200. Rules as for HPX. Zone Map and latest Prefix List, 85p post free, from Short Wave Magazine, 55 Victoria Street, London, SW1H-OHF.

However, he may take the KW-77 back with him after Christmas, leaving Norman to manage on the Sommerkamp receiver, and two-metre converter. The latter is tacked to a nice gainy aerial—an eight-over-eight J-Beam at 35 feet, with clear take-off from South round to West.

Noise is a problem for *J. V. Parker* (*Newcastle-on-Tyne*) who has lost much good listening time in his efforts to abate it. The secret is to prove how it is getting into the receiver. If it is the aerial, you must quiet the noise at source or live with it; if the mains you can try a filter in the receiver mains-lead, as close to the receiver-back as it is possible to get. Don't forget the mains-borne noise in your receiver may, and probably is, being picked up by the mains lead as an "aerial" itself, rather than arriving down the mains from the noise source.

N. Askew (*Coventry*) has turned his attention to VHF although he says he cannot hear much DX because of a poor aerial; and at the end of the letter asks how many VHF-*only* prefixes there are in Europe. Anyone care to count 'em all up?

With his usual long band report and notes on DX signals and their quirks, *H. M. Graham* (*Harefield*) adds a dash of philosophy this time. Musing on the fact that his hours of listening have only yielded two new ones, he adds that it is the attraction of the game at such a time, to see just how long one will go before chance puts another new one into the headphones. A good point, this, because it is true that for most of us it *is* chance!

As much as four hours daily at the receiver has been the fortune of *K. Kyezor* (*Perivale*) lately, with benefit to his HPX score—it makes up a little for those periods, past and to come, when he has been completely separated from radio by that work stuff.

To round us off this time, let *J. Fitzgerald* (*Great Missenden*) have a word. Since John has had his Trio and preselector, he has spent much more than usual time on the HF bands, but still manages a look at Eighty, a band where things are, in his words "rather difficult, to say the least." For Forty his words are even stronger, cribbed from a poem about Alaska, "God must have been very tired when he made it." The inhabitants are largely "nasty noisy things that toil not, neither do they (except in frequency) spin. The DX is there, but one gets bored with the Red Army choir and The Thoughts of Chairman Mao creeping in everywhere." Coming from a chap who has 100 countries heard on the band since the beginning of the year, that is poetic praise indeed!

Other Correspondents

Your J.C.'s garrulity has run away with the space again; so we have letters and table entries to acknowledge from: J. G. Ayton, *Sunderland;* R. Bence, *Cardiff;* D. J. Browning, *Bishops Stortford;* M. Fisher, *Bradford;* J. Halden, *Newcastle, Staffs.;* B. Hughes, *Worcester;* R. Impey, *Brentwood;* R. Mortimore, *Cardiff;* G. and S. Proud, *Letterston;* M. J. Quintin, *Wotton-u-Edge;* G. W. Raven, *London S.E.13;* E. W. Robinson, *Bury St. Edmunds;* D. Rodgers, *Harwood;* R. Shilvock, *Lye;* and B. Glass, *Plymouth.*

Sign-Off

Lots of letters mean lots of interest; but there were too many greetings to answer individually, so our thanks are tendered for them all. In his turn, J.C. wishes all readers a very Happy and Prosperous New Year.

Next time round, of course, will be the final showing for the 1971 HPX Table, a clean new start on this to be made on January 1, 1972, with the first appearance of the Table in our next-but-one "SWL."

Deadline for the March "SWL," will be **January 24,** no later, addressed as always to SWL, SHORT WAVE MAGAZINE, BUCKINGHAM. Till then, *au revoir.*

USEFUL FOR BEGINNERS

We can thoroughly recommend the new edition of *Simple Short-Wave Receivers* for anyone aspiring to build for himself something that will work and give results on the short-wave bands. Several basic designs are offered and much useful incidental information is given about the actual processes of construction. Well written and presented, fully illustrated in line and half-tone, of 140 pages in limp cover, *Simple Short-Wave Receivers* costs 87p post free and is obtainable, from stock, of: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, SW1H-OHF.

R.N.A.R.S. MEMBERSHIP

Membership of the Royal Naval Amateur Radio Society is around the 290-mark but, in spite of 71 new entrants during their last financial year and the Society now open over a wider field in the nautical sense, has never risen above about 300 or so. This is because, in common with many other societies, there is a large turn-over in membership—the newly-joined barely keep pace with those who drop out, for one reason or another (the RSGB is in just the same case!). However, the financial position of the R.N.A.R.S. is quite sound, total assets being nearly £350.

VHF BANDS

A. H. DORMER, G3DAH

PROPAGATION has been singularly poor for the last few weeks though there have been breaks as the Wx changed to high-pressure conditions. Earlier in the period many an amateur breathed a sigh of relief when he looked out of the bedroom window in the mornings and found the antenna still there! This led in turn to a reduction in activity. There seems to be a growing tendency to have a look at the bands and, if there is nothing much doing, to go and peer at the box, or indulge in some other domestic pursuit, whereas a couple of short CQ calls, even into an apparently empty band, would certainly produce some local contacts at least. As it was, two metres and four metres sounded more like 70 cm. usually does.

Things looked up a bit for the two-metre fixed station contest on December 5. Pressure was high, 1035 mB in the South on the Saturday when the IARU event started, and the EU activity recorded gave some indication that conditions might be reasonable for the following day. In the event, it was only the near Europeans who were coming through at easily workable level with a few, very weak, DL on the SSB channel. Propagation appeared to be best East/West on the Sunday morning, but by around midday the North/South path improved and contacts at 200 miles or so were made with some ease. Activity was high, and the leading stations were passing scores around the 120 mark. There seemed to be little CW operation, and the long-distance paths were characterised by deep and rapid QSB at times. However, generally, things were brighter than one might have hoped, or anticipated from the picture of activity during the preceding few days.

The fog on the motorways was a dire disaster for many, but the accompanying abrupt temperature inversion and high pressure brought a welcome relief to the monotony on both 2m. and 70 cm. on the night of December 7. HB9, DL and LX were all worked on 2m. SSB, and 70 cm. was productive of 200-mile contacts at good signal levels, although activity was not as high on that band.

Four metres remained quiet for most of the time, although there was a slight lift on December 1, which, incidentally, did not seem to affect two metres at all. G3VPS/P, working from a QTH near Lewes, was a goodish signal in the Midlands and the North West, as were those from G6HD in Kent and G2DN in Surrey, but perhaps his B.44 Rx was a bit on the blink as he was having trouble copying the weaker signals on 70·26 MHz.

There really is little to report about 70 cm. reception up to the end of the first week in December other than that repeated calls on the band elicited no replies at all. The London beacon was well down in signal strength for days on end, and the Sutton Coldfield beacon was inaudible for much of the time. The Dutch beacon was not heard at all. One presumes that it is still operative, but it might be well to recall that a frequency change to 433·0 MHz is reported as imminent, so if you are searching for it, have a look up there as well as on 432·15 MHz. G8APZ, G8AZU and G8DKK *et al* are still venturing out portable on Sunday mornings and offering, thereby, some choice counties on 70 cm. An amusing sidelight on the poor 70 cm. propagation was afforded by the experience of G3ZYC who sold a converter to a chum of his and had it returned with the comment that it didn't work as no signals could be heard on it. It did work but the chum was a newcomer and presumably expected 70 cm. to be as busy as two metres is at times!

News of activity on 23 cm. is usually scarce, but congratulations are due to G3LTF who succeeded recently in putting a 23 cm. signal into OE2OML. Unfortunately, a two-way QSO was not possible as the Austrian station had no Tx, and this was more of a pity than might be thought at first glance, since such a contact would have been a world record for the band.

VHFCC Awards

After an interval of some months, it is a pleasure to welcome a new member to the VHF Century Club with the award of Certificate No. 12 for operation on 70 cm. This time it is Peter Burden, G3UBX (Wolverhampton) who joins the ranks. He started using the band some four years ago with a nuvistor converter, a borrowed TW2 and varactor, and an 8/8 antenna. Since then, the aerial systems have ranged through an 18-ele Parabeam, two stacked Parabeams, a Multibeam, two Multibeams and finally *four* Multibeams at some 60ft. up on a telescopic tilt-over tower which can be lowered in seven minutes flat. A series of converters of various designs has been used, the most successful being based on the G8AYN model, a version of which, using two 2N5245 RF stages, gives exceptional strong-signal performance, but does not do as well on weak signals. Transmitters have included a QQV06-40A tripler, a QQV03-20A tripler (which gave more RF output than the larger, but less efficient, valve at these frequencies) and finally, a QQV03-20A tripler driving a QQV03-20A PA. The site is relatively poor, with screening from North East round through East to South West, but to the West the take-off is particularly good. It has not proved to be too difficult to obtain the necessary QSL cards for the Award, but Peter finds that some operators with well-known and long-held callsigns seem to be reluctant to QSL, and quotes one who admits to having an excellent collection of stamped addressed envelopes!

Award No. 119 for operations on two metres goes to Geoff Wilkerson, G8BPN (Stoke Poges, Bucks.). All contacts were made using an HW-17A Tx, a mosfet converter into a Hammarlund HQ-170A, and an 8-ele Yagi at 30ft. Recently, the

gear has been rebuilt, and the Tx is now a series-gate modulated QQV06-40A running 130 watts into a 10-ele Skybeam at 46ft. The QTH is 150ft. a.s.l.

Martin Dann (Sheffield) gains Award No. 120 for operation on two metres between May and September of 1971. It took 336 contacts to get the 100 QSL cards, and this seems to be about the norm these days. He has now worked 451 different stations in 13 countries and 53 counties, and cards are still trickling through. The gear consists of a QQV03-20A Tx running 17 watts to a 6-ele beam, a G3LGK converter, and a 25 year old BC-348. Plans are in hand for a QQV06-40A linear for AM, CW and SSB, and a 10-ele Skybeam at 38ft. The QTH at 425ft. a.s.l. is pretty clear in all directions, and is far enough back from the Pennines for Martin to be able to work across them.

Awards Nos. 121 and 122 both go to the same operator, the first time that this has happened simultaneously. John Hunting, G8DPV (serving with the R.A.F. at Brize Norton, Oxon.) is the recipient, and the claims are based on contacts made both from that county and from a site near Stow-on-the-Wold, 770ft. up in the Gloucestershire countryside. At the fixed location John runs an HW-17 and an 8/8 at 35ft., and for /P the same Tx with an 8-ele Yagi at 20ft., and a DC/DC inverter operating from the car battery to supply the power. He does not expect to be very active in the next few weeks as the Tx is due for a major overhaul and the antenna is down for a similar reason, leaving him with but a halo in the house for such contacts as he can make.

Congratulations to them all.

Working Real DX

For those who would like to have a go in 1972 at Meteor Scatter communication, the following are the predicted showers which are most likely to be productive of results during the first six months of the year:

Quadrantids	**January 1-5**
Lyrids	**April 19-23**
Aquarids	**May 1-6**
Scorpids	**June 2-17**
Perseids	**June 4-6**

Many of us must have been vastly impressed with, and perhaps slightly envious of, the quality of the speech communication from the astronauts on the moon, and wondered whether it would be possible to receive the transmissions direct. For those who wish to try, a watch on 296·8 MHz *might* be fruitful, as this is the Space/Earth channel for the next Apollo mission in February, 1972. Choice of a suitable antenna raises a bit of a problem, but a pair of 10-ele crossed Yagis pointing at the moon when she is visible *might* do the trick, always provided that the rest of the receiving gear is on the top line—but don't be too optimistic, the path-loss is high. (And, strictly speaking, you need special permission

THREE BAND ANNUAL VHF TABLE

January to December, 1971

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL pts.
G3OHH	52	7	63	7	33	5	167
G3COJ	37	5	64	16	30	7	159
G3DAH	37	3	60	13	34	7	154
G3ZYC	45	5	37	8	46	10	151
G5DF	24	2	55	13	32	7	133
GD2HDZ	28	4	54	9	24	4	123
G8CVD	—	—	61	15	39	7	122
G8ATS	—	—	53	12	41	9	115
G8BCA	—	—	55	10	40	9	114
G8CUT	—	—	54	13	22	5	94
G3ZPZ	—	—	80	13	—	—	93
G3JXN	27	2	57	5	—	—	91
G3FIJ	4	1	45	9	17	6	82
G2AXI	24	3	39	4	8	2	80
G8BKR	—	—	48	6	21	4	79
G3EKP	27	6	24	7	8	6	78
G2JF	—	—	53	19	—	—	72
G8BWW	—	—	40	8	10	5	63
G8DPV	—	—	52	9	—	—	61
G3IAR	31	3	21	4	—	—	59
EI6AS	15	5	30	6	1	1	58
G8ECK	—	—	46	9	—	—	55
G8CBU	—	—	39	7	5	1	52
G8AUN	—	—	32	9	3	4	48
G4ALN	—	—	37	10	—	—	47
G8CXC	—	—	33	12	—	—	45
G8EMS	—	—	35	8	—	—	43
G8CYN	—	—	32	9	—	—	41
G8APZ	—	—	—	—	33	6	39
GM3EOJ	—	—	18	10	3	1	32
PAØLY (G3TMQ)	—	—	13	6	—	—	19

This is the penultimate Table for the year ending December 31, 1971. Please send in your claims for your final score by the end of the first week in January, 1972, so that placings for the year may be published in the February, 1972 issue. The Tables recommenced on January 1, 1972. The address is: "VHF Bands," SHORT WAVE MAGAZINE, Buckingham.

from the Ministry even to try! *Editor.*)

Classes of Transmission

Your scribe has several times been asked for the meaning of the various classes of transmission which are quoted in the *media* as permissible for various amateur bands. Omitting those which are not in general amateur use, the following gives the main divisions and subdivisions, from which the symbols are derived:

Type of Modulation	Symbol
Amplitude	A
Frequency (or phase)	F
Pulse	P
Method of Transmission	
No modulation	0
Telegraphy, CW	1
Telegraphy, MCW	2
Telephony	3
Facsimile	4
Television (video only)	5
Duplex telegraphy	6
Multi-channel telegraphy	7
All other cases	9
Supplementary Characteristics	
Double sideband	*None*
Single sideband—	
Reduced carrier	A
Full carrier	H
Suppressed carrier	J
Two independent sidebands	B
Redidual sideband	C
Pulse—	
Amplitude modulated	D
Width modulated	E
Position modulated	F
Coded	G

From the above data, it can be seen that SSB with suppressed carrier, for example, is A3J, and that P3E is telephony with puse-width modulation, and so on. Hope this answers the questions.

Band Planning

During contacts, and attempted contacts, with the GM and GI stations during the October and November openings on two metres, it became apparent that the existing Band Plan, with the whole of the spectrum from 145·5 MHz to 145·975 MHz open to operators from the Wash northwards, made it difficult, and at times impossible, for stations in the far North and North-West and those in the far South to establish a QSO and hold it for long without QRM raising its ugly head. The situation was aggravated by the practice of certain London and Midland stations and nets operating out of Zone.

With this exception, the present Band Plan seems to have met with a favourable response and to be operating as intended. Change is always unwelcome, and so rather than amend the plan formally at this stage, it has been agreed with the VHF Committee of the RSGB that a voluntary scheme should be brought to the notice of operators which would seek to allocate a section 100 kHz wide at 145·85 MHz to 145·95 MHz for GM and GI. It may be that this would not solve all the problems—one recalls that many GM operators use a frequency as close as possible to 145·8 MHz, since this was the lower boundary under the old Band Plan, but it could be a step in the right direction, particularly if, at the same time, it discourages those swishing, out-of-Zone VFO operators.

Of course, the Band Plan is *not* mandatory, and so nobody can be forced to observe it—but doesn't it seem that such a scheme as is now proposed would give the Northerners a much better chance of being heard at DX range and, similarly, the G stations a better chance of working them?

News Items

G3OJZ is shortly moving QTH to a 500ft. a.s.l. site near Folkestone and will be operating on two metres with 15 watts and a 6/6. If you can't contact him there, try a visual the next time you go to the Continent on the *Free Enterprise V*, a vessel belonging to Townsend Ferries. He is the radio officer aboard her.

Also still afloat is Richard Constantine, G3UGF/MM, whose operations on Two have been reported previously in this Column. He was in great demand recently when his ship was in the Manchester Ship Canal. He was signing /MM at this time, and this has been queried since the correct suffix to be used when operating on inland waterways is /M and not /MM. But that is for inland waterways only, and the Manchester Ship Canal is not classed as such, so Rick was quite correct. Now that the clocks have been altered, his duties preclude operation between 4-6 p.m. and 8-10 p.m. so look out for him earlier in the evenings. He carries a range of xtals applicable to the Zone nearest to the ship's position.

The North-West 4m. net on 70·26 MHz is active most nights from about 2245 hrs. onwards, and would be pleased to welcome callers. Even if you do not qualify geographically for membership, participating stations turn their beams to the South-East during a lift and so give the Southerners a chance for a good DX contact. Callsigns active are: G3TSJ, G3OHH, G3TEY, G3URK, G3PMJ, G3SMV, G3SXT, G3WIC and G3WZN, among others. Incidentally, while on the subject of 4m., the comment last month from G3HBG in Surrey that he is screened to the North, does not seem to apply with equal emphasis in the North-West, where he is considered one of the outstanding signals from the *South*—just shows something.

GD2HZ is moving QTH and will be found at Ashfield House, Old Laxey Hill, Laxey, I.O.M. from December 1. The move will lead, inevitably, to a period of inactivity while the gear is being re-installed, but Arthur hopes to be back on the air again before long.

G4ALN is now putting the finishing touches to a 70 cm. rig. The converter has two BF180's in the RF stages and a 144 MHz IF, while the tripler runs about 25 watts input with phase modulation to a 45-ele Multibeam. Under construction also is a 4ft. dish for 23 cm, with a ring mixer and varactor tripler on the drawing board.

G8BKR reports that GW8AGI and GW8COJ are both active from Newport, Mon., so if you want a QSO with that county have a look between 432·1 MHz and 432·14 MHz. They both have a good take-off to the East and South.

The Governmental decision to establish 44 counties in England by 1974 will have repercussions on the Annual VHF Tables and certain Awards. The new entities proposed are Merseyside, Greater Manchester, West Yorkshire, South Yorkshire, North Yorkshire, West Midlands, Tyneside, Avon, Malvernshire, Teesside and Cumbria, and these will be created by the re-arrangement of existing county boundaries. It is early days yet to introduce changes in our present county listing, but amendments will be incorporated as necessary. You should get your wanted countries before they cease to exist!

Just as a matter of interest, do you know the origin of "CW"? In the early days of ship's wireless it was the phonetic equivalent of "seek

you", meaning Calling All Stations. With addition of the suffix "D" it meant danger. In 1906, an International Conference recommended that it be dropped in favour of the now familiar "SOS". Contrary to popular belief, these letters do not stand for anything specific, but were adopted as being the easiest to send and the most distinctive to decipher.

Mullards are offering a new Vidicon camera, the 20PE13, at what seems the very reasonable price of £26·25 for one off. This is a separate mesh tube having a higher resolution than the 20PE11, and it comes complete with the scanning coil assembly. They are also advertising for hire (at £2) a new film on *Modern Semiconductor Devices* which deals with the operation of some of the more modern S/C items in use. Report has it that this film is of considerable amateur interest, and Club secretaries may care to note that it is available from the Mullard Film Library, 269 Kingston Road, Merton Park, London, S.W.19.

Group Activity

The Colchester North-East Essex Technical College Radio Society (*phew!*) is planning a "Two Metres and Down" contest over the week-end of March 25/26. Further details when plans are finalised.

The next meeting of the South-East UHF/VHF Group is on January 21 at Wye College, University of London, near Ashford, Kent. The occasion will embrace both the AGM of the Group and an "Open Forum". The December meeting produced almost a record attendance to hear Geoff Stone, G3FZL, talking about new UHF/VHF developments and techniques, and also expounding on the prospects for an FM repeater system in this country.

The Bangor & District Amateur Radio Society are re-activating the Northern Ireland 2m. beacon at a new site at Tullywest, near Saintfield in Co. Down. This puts it in QRA Locator XO41j, to the south-east of Belfast instead of the south-west of Londonderry, and therefore much nearer this country. Operating characteristics are as follows:— QRG 145·990 MHz, output power 8 watts, antenna system two 4-ele beams, one headed East of North for auroral warnings and as an aid to the GM operator in assessing band conditions, and the other beaming South-East. Keying sequence is: Callsign GB3GI repeated five times followed by 90 seconds of carrier. The antennae are then switched and the sequence repeated in the other directions. There is *no* simultaneous transmission on both headings. Operation should have commenced by now and reception reports would be much appreciated by Eric Sandys, 25 Moira Park, Bangor, Co. Down, N.I.

Groups and individuals interested in Slow Scan TV will have the opportunity to enter a world-wide contest sponsored by the Italian magazine *CQ Elettronica* during February, 1972. Times are 1500-2200z on February 25 and 0700-1400z on February 13. All authorised bands may be used and the scoring system is based on one point per contact with multipliers of 10 points per Continent and 5 points per country. Logs should be sent by March 20 to Professor Franco Fanti, via A. Dallolio 19, 40139 Bologna, Italy. Further details may be obtained from the BATC.

German operators have decided to make Wednesday evenings an "Activity Night" for UHF/VHF operations starting at 1930z. Clubs and individual stations will be looking for DX inside and outside Germany at these times. The DL/DJ licensing authorities have stated that Club stations with Class-C licences (as for our Class B) will be issued with calls from the block DBØ--, those between DBØWA and DBØZZ being reserved for Clubs operating VHF/FM repeaters.

Annual VHF Tables

A final word about the Tables: These closed on December 31, and the new series commences from January 1, 1971. Please send in your final claims to reach Buckingham by the end of the first week in January so that final placings for 1971 can appear in our February issue.

Contests

No VHF Contest Calendar for 1972 had been received at the time of writing, but on January 8 there will be a two-metre SSB contest, 0900-1300z—instead of the usual Monday night session.

Deadline

Deadline for the next issue is **Saturday, January 8** and the address for news, views, claims and comment is: "VHF Bands", SHORT WAVE MAGAZINE, BUCKINGHAM. Cheers for now, and a Happy New Year *from G3DAH.*

G3WKF/G8CMG TWO-METRE EXPEDITION

Having heard the astonishing claims of 144 MHz activity in the North and East of England and both of us living in very unfavourable districts in the extreme South-West for DX to the North and East, we decided to go to Dorset for a week's holiday in September to find out for ourselves.

On arrival, a 30ft. pole was erected and action began at 1800z, with incredible results! Taking about two hours to tune from 144 to 146 MHz, we must have worked nearly everyone in Wolverhampton, Manchester, Liverpool, Sheffield and Derby with excellent reports both ways. G3BJB Cumberland, G3CXQ Leeds, EI2A Navern, GI8AYZ/P Larne were also worked, and from the East Coast we were getting reports similar to those from the North. Many stations in the London-Home Counties area were calling us, from G8EBJ Hastings round to G8IYV Norwich.

We were mostly crystal-controlled and it was very noticeable that the man who came through with the best signals was using a 4/4 or 6/6, or a long Yagi. Our equipment was a long-spaced 8/8 slot-fed at 30ft. and the main rig was a QQVV0-3/10 modulated and fed into a 4CX250B linear *via* an attenuator unit; DC input was 140 watts and efficiency 35-40%. The Rx was a 6CW4 converter to an *Eddystone* EC-10 tuning 1·5-3·5 MHz; the standby rig ran 7 watts AM and 14 watts FM.

It was our first attempt at an expedition; our anchor men G8DPV/A, G2BHW and G5ZT maintained regular skeds throughout the week from Cornwall and Devon.

MAGAZINE CLUB CONTEST

REPORT AND RESULTS, THE 26th ANNUAL MCC, NOVEMBER 6-7, 1971

HERE, for the 26th successive year, we come to look at what happened during the Magazine Club Contest over the first weekend of November.

The final placings are given in Table I, from which it can be seen that the first three, nation-wide, are:

Manchester University Institute of Science & Technology, G3CXX ... 6981 pts.

Durham Contest Club, G4ANR ... 6960 pts.

Maidstone YMCA Amateur Radio Society, G3TRF ... ... 6375 pts.

Obviously, it was a close thing between G3CXX and G4ANR—only 21 points in nearly 7,000!—and in the log checking and marking we had first one and then the other in front. Maidstone come up in 3rd place again this year, though they scored many more points than in 1970.

In general, the scoring, in terms of points totals, was a good deal higher than last year, as Table I shows. This we ascribe to two factors: Conditions for GDX working were good for both sessions, with noise levels low, and there were more Clubs to work than in 1970. According to our check from the entries received and the invigilators' reports, at least 110 Clubs were on the air, though not all for both evenings. This compares with fewer than 100 on for the 1970 MCC.

From Table I, it is seen that 83 actual entries were received—meaning that something like 30 more Clubs played a part in 1971 but failed to send in a log, which is a pity. From our own monitoring some of these Clubs, on for both sessions, were going well and ought to have got round to putting in an entry to complete their participation.

In Table II, we show the first three in each Zone—for, be it remembered, MCC is devised so that, in effect, Clubs are competing primarily with others in their own Zone, under scoring conditions as near fair and equal for that Zone as we can make them. Looking at last year's Zone positions, Glenrothes again lead in Zone A this time but in Zones B and C new Clubs appear compared with 1970, while in Zone F (Southern), the 1st and 2nd positions are reversed, Verulam having led previously (with 5823 pts.). For Zone J, EI9ONE and EI4LRC are again in the lead positions, with about the same number of points between them.

Looking further down Table I, obviously there was only the thickness of a cigarette-paper between Southampton (G3SOU/A), Standard, Harlow (G3NIS) and Reigate (G3REI).

Notable Movements

Clubs going up compared with 1970 include Maesteg, Cambridge University and Kings Norton—though the biggest advances are shown by Moray Firth, from 66th to 11th this time; Limerick, 54th in 1970, to 26th; G3BZU, R.N.A.R.S., from 50th to 31st; and Addiscome 30th to 14th in 1971.

Other Clubs who entered in 1970 will similarly be able to evaluate their performance this time by a comparison with Table I opposite.

Operating and Procedure

In the opinion of all the invigilators, this was generally very good, and we do not mean just in terms of fast sending (some of which was rather wabbly, to say the least). One notable weakness was inaccurate netting, which had the effect of generating more re-calling (and so QRM) and also unnecessary CQ's. The clean, crisp operator right on the frequency would nearly always get the contact, while others calling 2 kHz or so off were just not being noticed.

One certain Club with a strong signal was noted making protracted tuning-up noises right on one of the busiest channels, causing intense QRM—this group was marked down for disqualification but, as it happened, though on for both sessions, they did not put in an entry!

Some rather poor notes were in evidence at times and after the first session one at least of the invigilators had grave doubts about Cambridge, G6UW. However, perhaps somebody told them, because by the Sunday evening their signal quality had improved considerably. There were far fewer complaints this time about individual stations—which anyway is a matter for the invigilators to judge.

The General Check

Consistently over-strong signals must always be suspect but as every entrant made the declaration required by Rule (7), the invigilators felt content to accept this, especially as it is the aerial system and not so much the power that determines signal level. For instance, G3CXX, one of the strongest signals during both sessions, had the choice of two massive antennae—a half-wave wire 150ft. above ground, and a 300ft. semi-vertical with the far end 250ft. up; their Tx was a Codar A.T.5. Nevertheless, at our monitoring point in North Bucks., there were times when both GM3TKV/P (½-wave Ae. at 98ft.) and EI9ONE (a half-wave over a reservoir) were even stronger than G3CXX.

The "loading" on the band was more or less the same

FEBRUARY "MONTH WITH THE CLUBS"

Deadline January 7, address all reports to "Club Secretary, Short Wave Magazine, Buckingham." Please don't miss this because we cannot cope with late reports!

for both sessions, with a spread of about 70 kHz in the LF area. With more than 100 Club stations (and probably 40+ non-Club) on at any given time, inevitably this meant a high level of QRM, demanding really sharp selectivity, slick operating and accurate netting to accumulate contacts rapidly. It is evident from the logs that many of the back-markers hardly got outside their own Zone.

Participation by non-Club stations appeared to be higher than in recent years—at any rate, Manchester G3CXX had 26 such QSO's and G4ANR for Durham no less than 80, worth at least 800 points, without which they would have lost anyhow two places. Maidstone G3TRF made 640 pts. from non-Club contacts; lacking these would have made them equal 4th with Verulam. Further down Table I, West Scotland GM3YCB worked 32 stations for 10 pts. each, and not all round Glasgow way, either. While Nuneaton G3XJU at 61st place had 36 non-Club contacts (without which they would have been a good deal further down the list), Greenford G4AHU, in the London area with a high level of Top Band activity, worked only four N/C's; on the other hand, Echelford "B" G3TZH, in the same neighbourhood, gained 150 pts. from N/C stations. All this goes to show that, as has so often been said in the past about MCC, it is always worth looking for non-Club contacts.

As in recent years, several Europeans came on—notably OL1AOH, Prague, and HB9NL, Bueron—and got through the QRM to some of the Clubs.

Our Mistake!

That P-code identification caused some mystification

TABLE I

Positions and Scores, Twenty-Sixth MCC

PLACE	CLUB	REGION	POINTS	PLACE	CLUB	REGION	POINTS
1	Manchester Univ. Institute of Science & Technology (G3CXX)	B	6981	43	R.A.F., Locking (G3IRS)	F	2995
2	Durham Contest Club (G4ANR)	B	6960	44	Acton, Brentford & Chiswick (G3IIU)	F	2991
3	Maidstone YMCA (G3TRF)	F	6375	45	Ainsdale, Lancs. "B" (G3LWK)	B	2986
4	Maesteg Contest Group (GW3XJC)	H	5866	46	Grimsby & The Hereford School (G3YMF)	D	2981
5	Verulam (G3VER)	F	5735	47	Purley, Surrey "B" (G3ZEN)	F	2954
6	Cambridge University (G6UW)	D	5561	48	Southampton (G3SOU/A)	F	2906
7	I.R.T.S. Region I (EI9ONE)	J	5550	49	Standard, Harlow (G3NIS)	F	2902
8	Kings Norton Contest (G3GVA)	C	5302	50	Reigate (G3REI)	F	2900
9	Glenrothes (GM3YBQ/A)	A	5228	51	Cray Valley, Eltham (G3RCV/A)	F	2860
10	Surrey Radio Contact (G3SRC)	F	5139	52	Eccles, Lancs. (G3GXI)	B	2794
11	Moray Firth (GM3TKV/P)	A	5109	53	Ardeer, Ayrshire (GM3USL)	A	2763
12	Govt. Communications (G3SSO)	F	5065	54	Shefford, Beds. (G3VMI)	F	2655
13	Crawley (G3WSC)	F	4980	55	North-West Durham (G4AAD/A)	B	2645
14	Addiscombe, Surrey (G4ALE/A)	F	4830	56	Bromsgrove (G3VGG/A)	C	2624
15	Wirral DX Assocn. (G3OKA/A)	C	4815	57	Scarborough (G4BP/A)	B	2615
16	Manchester University (G3VUM)	B	4792	58	Lough Neagh (GI3RXV)	J	2600
17	Northumbria Contest Group (G4AMU)	B	4737	59	Silverthorn, East London (G3SRA)	F	2520
18	Mid-Sussex (G3ZMS)	F	4556	60	Simon Langton School, Canterbury (G3OSL/A)	F	2428
19	Wheatsheaf, Grimsby (G3PDL)	D	4518	61	Nuneaton (G3XJU)	C	2415
20	Southend (G5QK/A)	F	4506	62	Sutton & Cheam (G4ADM)	F	2315
21	Sutton & Cheam (G2DMR)	F	4448	63	Spalding, Lincs. (G4OO)	D	2295
22	White Rose, Yorkshire (G3XEP/A)	B	4436	64	Hereford (G3YDD/A)	C	2293
23	West of Scotland (GM3YCB)	A	3254	65	Purley "B"	F	2182
24	Leyland Hundred "A" (G3GGS)	B	4284	66	South Shields (G3DDI)	B	2174
25	Salisbury (G3FKF)	F	4187	67	Ainsdale, Lancs. "A" (G2CUZ)	B	2156
26	Limerick (EI4LRC)	J	4109	68	Thanet, Kent (G3DOE/A)	F	2000
27	Univ. Coll. North Wales (GW3UCB)	H	3918	69	Wimbledon (G3WIM/A)	F	1998
28	Greenford, Middlesex (G4AHU)	F	3821	70	Shirehampton, Bristol (G4AHG/A)	F	1992
29	Echelford, Middlesex, "B" (G3TZH)	F	3814	71	Swansea Telephone Area (GW3ZGK)	H	1898
30	Midland (G3MAR/A)	C	3779	72	West of Scotland "A" (GM4AGG)	A	1887
31	R.N., H.M.S. "Mercury" (G3BZU)	F	3641	73	Isle of Purbeck, Dorset (G3ZZB)	F	1843
32	North Staffs. (G3VTE/A)	C	3599	74	R.A.F. Carlisle (G3XQD)	B	1661
33	Sunderland (G3RDI/A)	B	3542	75	Southdown, Sussex (G3WQU)	F	1574
34	Fareham (G3VEF)	F	3453	76	Maidenhead (G3WKX/A)	F	1557
35	Horsham, Sussex (G3TNO)	F	3448	77	Stoke-on-Trent (G3GBU)	C	1447
36	Edgware (G3ASR/A)	F	3413	78	Leyland Hundred "B" (G3ZRE)	B	1418
37	Wakefield Grammar School (G4AAQ/A)	B	3368	79	Kingsway Tech., Dundee (GM4AAF)	A	1371
38	Fareham, Hants. "C" (G3VXM)	F	3340	80	Mid-Lanarkshire (GM3YND)	A	1252
39	Purley, Surrey "A" (G3XMW/A)	F	3306	81	Reigate "B" (G3ZRF)	F	1217
40	Nottingham (G3EKW)	C	3137	82	Echelford "A"	F	1151
41	Horsham "B" (G3WZT)	F	3055	83	Oxford (G8IB)	F	670
42	Macclesfield (G3LDT)	C	3043				

and misunderstanding. The reason for it was that, after publication of the Supplementary List in the November issue, requests for idents. still kept coming in and we ran out of L-numbers for the Southern Zone F; it was thought unfair to go on with 3-digit L-numbers, so a few P-codes were issued, the recipients being asked to inform contacts that they scored as for Zone F.

In the event, several Clubs who eagerly demanded idents. not in the published lists either did not come on at all or, if they did, failed to put in an entry—so the effort was wasted, anyway. What we ought to have done was not to issue P-codes but to have gone into 3-digit L-numbers willy-nilly—after all, the groups concerned were weeks late in applying!

However, no harm was done, as all logs were carefully checked for the correct P-code multiplier (counting as Zone F) and adjustments to the score made wherever necessary. As examples, because of this Grimsby G3YMF and N.W. Durham G4AAD/A went up four places on their claimed score, and there were others who also garnered more points thereby We did our best!

Log Presentation

On the whole. this was good and many entrants, having studied Rule (6) in the way that they were meant to, had photostat'ed sheets set out accordingly.

But some people failed to comprehend the importance of Rule (6), because without a standard form of presentation, it is very difficult to check logs quickly and accurately. Offenders in this respect, which could have been a valid reason for disqualification, were Addiscombe, Northumbria Contest Group, Ainsdale "A" and R.A.F. Locking, all of whom used contest log forms bearing little relation to what was required by Rule (6). But we let them off—though it must not happen again next year.

A few of the other logs can only be described as distinctly scruffy—they were evidently the original scribbles which, though under the required headings, had not been transcribed to make a neat and legible entry.

One such log bore no Club name, no operating callsign, no ident. code, no points calculation as called for by Rule (7), and no signed declaration. Though we could have identified this masterpiece by cross-checking with the other logs, we felt it was hardly worth bothering with such a disinterested (and uninteresting!) effort—so it was ditched.

Several useful check logs were received, mainly for short periods during one session. The exception to this was the very comprehensive log presented, as in previous years, by SWL D. A. Law (Leicester), who monitored throughout both sessions. Of the 110+ Clubs known to have been on (either for one evening or both) he logged no fewer than 78, with each QSO heard timed to the minute and including signal reports and code numbers. By any standard, this is a considerable feat and proves a high degree of CW capability—remember, he was working single-handed and had to get it all down without a logger. Gear used by SWL Law is of the simplest—an elderly HRO, peaked up on Top Band, with a fairly nondescript type of 80ft. end-on wire. In other words, nothing special, proving that it is "what goes between the headphones" that matters most. SWL Law, obviously himself a first-class telegraphist, singles out GM3TKV/P as the best CW signal for quality and operating style that he heard during the 1971 MCC. For our information (and edification) he also keeps a 10-year running record of activity in MCC; from this, we see that for him 1964 was one of the vintage MCC years, with 87 Club stations logged of the 110 known to be on. The Law MCC check-log, with Top Band coverage over most of the U.K. from Leicester, is one that we always do appreciate and find most useful and interesting.

Comments and Opinions

Following are taken *verbatim* from individual reports: "Our aerials certainly helped in sorting out the QRM, switching one from the other" (*U.M.I.S.T.*) . . . "We have thought hard but fail to find any honest criticism of the rules. Our aerial for txm was a 3/8th-wave vertical, balloon supported, tuned against a radial earth system, with a horizontal wire for receiving as the vertical was found to be very noisy" (*Durham Contest*) . . . "We had an inverted-Vee dipole, apex at 70ft., with balanced bazooka feed; hope to put up two antennae next year as the GM's are worth digging for" (*Maidstone*) . . . "Nice to operate in MCC again this year though rather disappointed with the activity from other GW clubs. Had a bit of trouble at first when our Jap el-bug started sending Japanese Morse" (*Maesteg*).

"Once again a most enjoyable Contest; some stations seemed to vary in strength as conditions changed, others never very strong at any time, which must be a reflection of their aerial systems. We are disappointed that you do not issue certificates to top-place stations" (*Verulam*) . . . "You will notice we received some bad reports during the first session; this was because the Tx VR would not function on the 210v. AC we were getting; it was put right for the Sunday evening" (*Cambridge Univ.*) . . . "A very enjoyable Contest with conditions better than last year" (*I.R.T.S. Region I*) . . . "Not a good MCC for us—though we had our usual complement of operators and the same gear, designed for the job, as in previous years, we were hard put to it to find new ones to add to the score" (*Kings Norton*) . . . "First leg fell on Club meeting night and our four operators had to contend with QRM from members! But a most enjoyable Contest " (*Glenrothes*) . . . "Our best thanks for organising the Contest and for your continued support for 'The Clubs' over the years" (*Surrey Radio Contact*) . . . "We had the station set up in a caravan overlooking the Firth with a clear take-off all round but the gale-force wind was shaking us up at times" (*Moray Firth*) . . . "Lost at least an hour due to a sticking c/o relay; conditions good though trouble from charged rain over Cheltenham" (*Govt. Communications*).

"How about a bonus for working EU's?" (*Addiscombe*) . . . "Operated from a farm barn, warmest spot being the Vibroplex bearings, but it was worth it!" (*Wirral DX Assocn.*) . . . "Some stations need receivers!" (*Mid-Sussex*) . . . "Our main aerial was a 180ft. inverted-L tuned against a radial earth system; we had a very high noise level for the Saturday evening. This is only the third year we have entered MCC but each time our score improves—maybe we'll win about 1980!" (*Southend*) . . .

TABLE II
Leading Clubs by Zones

	Zone A—Scotland	
1st	Glenrothes, GM3YBQ/A	5228
2nd	Moray Firth, GM3TKV/P	5109
3rd	West of Scotland, GM3YCB	4354
	Zone B—Northern England	
1st	Manchester, U.M.I.S.T., G3CXX	6981
2nd	Durham Contest Club, G4ANR	6960
3rd	Manchester University, G3VUM	4792
	Zone C—Midlands	
1st	Kings Norton Contest, G3GVA	5302
2nd	Wirral DX Association, G3OKA/A	4815
3rd	Midland, G3MAR/A	3771
	Zone D—Eastern	
1st	Cambridge University, G6UW	5561
2nd	Wheatsheaf, Grimsby, G3PDL	4518
3rd	Grimsby & The Hereford School, G3YMF	2981
	Zone F—Southern	
1st	Maidstone YMCA, G3TRF	6375
2nd	Verulam, G3VER	5735
3rd	Surrey Radio Contact, G3SRC	5139
	Zone H—Welsh Area	
1st	Maesteg Contest, GW3XJC	5866
2nd	University Coll. of North Wales, GW3UCB	3918
3rd	Swansea Telephone Area, GW3ZGK	1898
	Zone J—Ireland	
1st	I.R.T.S. Region I, EI9ONE	5550
2nd	Limerick, EI4LRC	4109
3rd	Lough Neagh Shower, GI3RXV	2600

"Our third year in MCC and we thoroughly enjoyed it. We used an 80ft. vertical for transmitting and a 132ft. horizontal wire for receiving to reduce noise pick-up. Having the unfortunate distinction of being the most westerly station taking part, with very little Top Band activity (for which special permission is required) in Eire, we feel somewhat at a disadvantage"(*Limerick*)... "Most enjoyable Contest and a good introduction to the Top Band activity season" (*R.N.A.R.S.*) . . . "Our inverted-Vee was extended from 132ft. top to 264ft. by anchoring one leg to the roof-rack of the club treasurer's car—but it snapped half-way along before start-time on Sunday, so two members had to climb on the roof of the shack to make a repair; they both said they enjoyed the weekend" (*North Staffs.*) . . . "Plenty of stations to work, just a matter of sorting them out" (*Sunderland*)... "Our original logs were lost in a spectacular accident involving the hon. secretary's car. This was our first entry in MCC" (*Horsham*) . . . "Can't say we really understand the scoring system, and how about additional points for each new country worked?" (*Wakefield Grammar School*) . . . "Whatever happened to the good old 6.0 p.m. clock start—still gave us time for an extra jar or two afterwards!" (*Fareham*) . . . "The scoring system you use seems very fair and we enjoyed the Contest very much" (*R.A.F. Locking*) . . . "Scoring system seems fair enough for its simplicity, though perhaps it could be extended to non-Club stations as well—and since when has Cheshire been in the Midlands?" (*Ainsdale "B"*) . . . "It seems rather strange that a contact between D and B Zones should attract a multiplier of 13, when D-F is only worth 11—but we're not complaining, as we worked quite a few Zone B stations!" (*Grimsby & The Hereford School*) . . . "As usual, another excellent event, most enjoyable although we were not able to use our better-equipped stations. Thanks for another fine Contest" (*Reigate*).

"Would have thought that Somerset and also possibly Glos. should be in Zone G, with Devon and Cornwall. East Essex and Kent are a fair way from most of Somerset" (*Cray Valley*) . . . "We think that the Contest could have run longer, with a later start, otherwise FB" (*Shefford*) . . ."The most enjoyable MCC to date" (*Bromsgrove*) . . . "Not as successful for us as last year but a very enjoyable Contest" (*Scarborough*) . . . "Wish we could have worked all we heard!" (*Lough Neagh*) . . . "First MCC we have ever entered and thoroughly enjoyed it. Most impressed by the standard of operating and courtesy shown by participants—quite a change from contests on the DX bands" (*Spalding*) . . . "We thought the Contest well done and just about the right length. We had bad luck with our big inverted-Vee which collapsed in the wind" (*Thanet*) . . . "All operators thoroughly enjoyed the Contest and much experience was gained by our novices" (*Wimbledon*) . . . "Our first MCC, with an R.107 as Rx—not exactly the best contest tool!" (*Shirehampton*) . . . "Full BK is an advantage but this was cancelled out by probably the worst aerial in MCC—a bent end-fed 100-footer, varying in height between six and 25ft." (*Isle of Purbeck*) . . . "This is a notoriously bad area for Top Band and it's the first time we've had a score good enough to warrant an entry—even Loran and fish-phone are weak on a 254ft. inverted-Vee. And what about zoning us with the GM's, as we are only $6\frac{1}{2}$ miles from the Border?" (*R.A.F. Carlisle*) "Though it is felt that the GM multiplier is far too low the Contest was thoroughly enjoyed by our members" (*Kingsway Tech., Dundee*) . . . "We missed not having full transceive facilities, and as two of our ops. are VHF men they found the QRM and the speed of operating a bit staggering, to say the least" (*Mid Lanarkshire*).

Adjudicator Comment

The logs were marked as severely as seemed reasonable, especially in the upper echelons, two Clubs being heavily penalised for the occasional use of abbreviated callsigns, directly contrary to Rules (8) and (9). Otherwise, points were lost for incomplete log entries, poor time correlation and incorrectly copied numbers. On the other hand, as already mentioned, several Clubs gained points on their claimed scores.

It should be emphasised, however, that these adjustments did not much affect the final placings and it can be taken that Tables I and II are a fair reflection of this year's MCC.

It only remains for us of SHORT WAVE MAGAZINE to thank all participants for helping to make the 1971 event so enjoyable, interesting and successful.

Next Month

With the February issue, due out on January 28, we resume the regular "Month with The Clubs" feature in its usual form. Deadline is **Friday, January 7,** addressed "Club Secretary", SHORT WAVE MAGAZINE, BUCKINGHAM. For the months following deadlines will be *February 4* and *March 10*—Club scribes and hon. secretaries please note. And finally a very happy and prosperous New Year to all who follow this feature.

Q. & A. FOR THE R.A.E.

COVERING THE MAY 1971 EXAMINATION

The next City & Guilds Examination for Radio Amateurs—subject No. 55 in the C. & G. syllabus—comes up in May. As in previous years, we give here a set of "model answers" to the 1971 Paper—noting that for completeness we deal with all ten questions, though in the Exam. itself only eight need be answered, the two in Part I being compulsory. What the Examiner expects is that candidates should show by their answers that they understand the questions and could expand on them in detail if necessary. In other words, long and detailed explanations are not usually required—indeed, it might be argued that some of the answers given here are over-long. Formulae must of course be correctly stated and worked. To pass the R.A.E. involves getting at least 50% of the marks, and there are grades of "distinction" and "credit", though for the issue of an AT-station licence all that is needed is a pass. A certificate is awarded to all successful candidates, showing the grade achieved. Possession of this certificate is essential for the granting of a U.K. amateur transmitting licence—it is also accepted in the same way in many other countries in which an examination pass is required for an AT-station licence. The pass-rate on the Paper discussed here was 54·22%, and was the lowest for some years. This suggests that some of the questions may either have been somewhat outside the syllabus or unreasonably difficult for the average candidate. We incline to the latter view.—Editor.

THIS examination is divided into two parts; failure in *either* part will carry with it failure in the examination as a whole.

The maximum mark for each question is shown. Answer *Eight* of the following ten questions, as follows: Both questions in Part I (which are compulsory), and *Six* questions in Part II.

PART I

Q.1. (*a*) *What is the maximum speed at which call signs should be sent in Morse?*

(*b*) *How should the call signs be sent in radio-telephony?*

(*c*) *How frequently should the call sign be transmitted?*

(*d*) *What indications must be given in the call sign when the station is being used from alternative premises, temporary premises, and temporary locations?*

(*e*) *What prefix is used by a station being operated in* (*i*) *Channel Isles,* (*ii*) *England,* (*iii*) *Isle of Man,* (*iv*) *Northern Ireland,* (*v*) *Scotland,* (*vi*) *Wales?*

(*f*) *How often should details of temporary premises or locations be sent?*

(*g*) *What are the regulations concerning the retransmission of recorded messages?* (*15 marks*)

Answer (1)

(*a*) 12 words per minute maximum.

(*b*) Arranged with the station call sign last (G3ABC, this is G4ABC, over), and, if phonetics are used these are recommended as listed in the official lists for telephony operation. In any case, phonetics of a facetious or objectionable nature must not be used.

(*c*) At the beginning and end of each period of transmitting, before a change of frequency, or, in the case of a long transmission, at least once in every 15 minutes.

(*d*) In the case of a station being used at the alternative address no indication is called for on the air, but application for permission to the local Telephone Manager (E/Radio) should have been made at least seven days before the commencement of operations. For temporary premises, one adds the suffix /A to the call sign and uses the appropriate prefix of nationality for the country in which the temporary premises are—see (e) below. For temporary locations the suffix is altered to /P, and the prefix of nationality adjusted if needed.

(*e*) (i) GC, (ii) G, (iii) GD, (iv) GI, (v) GM, (vi) GW.

(*f*) When operating under either the /A or /P suffix, the location should be announced over the air at the beginning and ending of each contact with an amateur station, or once in every fifteen minutes, whichever is more frequent.

(*g*) A message emanating from another amateur station may be recorded and re-transmitted, provided that the call signs are not transmitted with the recording, and that the retransmission is intended for the originating station *only*.

Q2. Why is a transmitter, having a Class-C final amplifier stage, more liable to radiate harmonics than a transmitter having a Class-A amplifier?

With the aid of a block diagram, show where a low pass filter could be inserted to minimise the radiation of harmonics from a transmitter.

Draw the circuit diagram of a filter to suppress harmonics above 30 MHz, and describe its construction. What types of capacitors and inductors would be used? (*15 marks*)

Answer (2)

The Class-A stage is substantially linear, and will only amplify harmonics present in the drive waveform, to about the same degree as present in the fundamental. Thus it does not, essentially, degrade the signal it amplifies. On the other hand the Class-C stage is "cut-off" for a large proportion of the time taken to complete one cycle of the drive waveform, due to the high grid bias. When it does conduct, the amplitude of the driving waveform is so large that the grid is driven strongly positive. This means that for sine-wave drive at the grid, the output at the anode is a series of short, powerful pulses, which are used to "ring" the output tuned circuit. Thus the output will have a high proportion

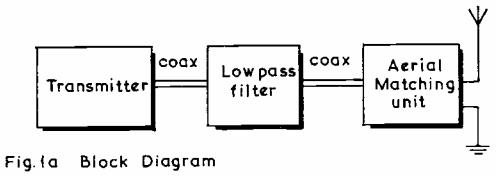


Fig. 1a Block Diagram

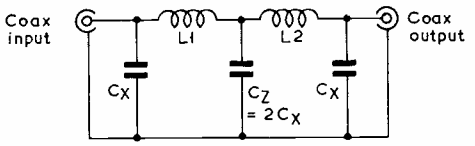


Fig. 1b Rudimentary Low-pass Filter

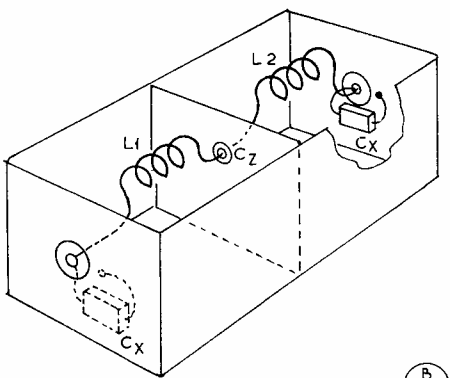


Fig. 1c Construction of Rudimentary Filter

B 106

Fig. 1.a. *(To answer Q.2).* **The transmitter is designed to have an output impedance of, say, 75 ohms. So also is the low pass filter, the cables, and the Aerial Matching Unit. In Fig. 1.b is a rudimentary low-pass filter, see text. Formulae are in the Handbooks, but would not be quoted in an examination of this standard. Fig. 1.c. Mechanical construction of filter, less lid. See text. The lid would be close-fitting and soldered or screwed to the body at frequent intervals by self-tapping screws.**

of harmonics generated by the stage itself.

A low pass filter may be inserted in the output of a transmitter, as shown in Fig. 1A. It is essential that the filter, wherever it is placed in the transmitter-aerial path, be fed with the correct terminating impedance at each end for which it was designed. The transmitter is commonly designed to have a low output impedance of, say, 75 ohms; the cable is of the same characteristic impedance, the filter is designed for 75 ohms, and finally the Aerial Matching Unit transforms whatever impedance the aerial or its feeder presents to the station into 75-ohm unbalanced which matches the cable to the filter.

A rudimentary low-pass filter is shown at Fig. 1B, comprising two "constant-k" sections; a practical filter would probably have *m*-derived end-sections around a "constant-k" centre section, to sharpen up the transition from pass to stop bands. Fig. 1C shows the mechanical construction; it should be noted that C_z is, in effect two of C_x in parallel (one belonging to each section of filter) and so it could very conveniently be made a "feed-through" capacitor, to carry the wiring through the screen as well as its prime function. The two capacitors C_x are close-tolerance silver-mica units, with minimum lead-lengths. L1 and L2 will be air-wound, without a "lossy" former, and hence of stout wire. Even though there is an inter-chassis screen, the inductors ideally should be at right-angles to each other, so as to assure no coupling between them. The screen between sections will be tightly fitting and earthed, which implies soldering it in, and the assembly will be completed by a close-fitting lid which grounds all round and to the screen to ensure complete isolation.

PART II

Answer Six questions in this Part.

Q.3. Describe the construction of a power transformer having a primary winding adjustable for 200, 220, and 240v., 50 Hz supplies, and capable of providing outputs at 500-0-500v. 100 mA, 6·3v. 3A, and 12v. 1A. Ignoring any transformer losses, what is the primary current when the secondaries are supplying their full rated output and the primary e.m.f. is 240v. 50 Hz? *(10 marks)*

Answer (3)

The designer will have determined the gauge of wire he requires for each winding; similarly he will have determined the size and shape of laminations and their number, and a bobbin to fit. On the bobbin he will now wind an appropriate number of turns for the 240v. primary, with tappings at the correct number of turns for 200 and 220 volts, the leads being brought out through suitable sleeving. Between each layer of winding there will be a layer of special tape, of a type determined by the designer from consideration of the environmental requirements. Over the completed primary two layers of the tape will be wound. Next follows (on the better class of transformer) a Faraday screen, and another couple of layers of tape; the Faraday screen will be brought out through a sleeved wire as before. Then follows the 1000v. secondary, tapped at half the total number of turns, and given a layer, of tape between each layer of winding. The tapping is brought out through sleeving, as are the ends. Again come two layers of tape, then the twelve-volt winding of heavier-gauge wire, interleaved as before, and covered with two layers of tape before the final heaviest-gauge 6·3v. winding is put on. A couple of layers of tape complete this stage.

The completed bobbin is next fitted with the appropriate laminations as already defined, and then the assembly is completed "in the white" by providing suitable clamps to hold the laminations and some sort of tag-panel (on the better-class unit) for the wires. At this stage an unpotted transformer would be with profit varnish-dipped; a C-core type would be fitted into its can at this stage, wires terminated to the lead-out tags, and the assembly filled with oil. Finally, the tags would be identified by label or signwriting.

The transformer is assumed to be 100% efficient by the question. Hency Primary VA = Secondary VA (total) . . . (1).

Now, only half the 500-volt winding will be conducting at any given time, as such a winding is used with

biphase half-wave rectification. Hence, 500v. 100 mA gives 50 VA; 6·3v. 3A = 18·9 VA; 12v. 1A = 12 VA; 50 + 18·9 + 12 = 80·9 VA total secondary load.

From this, and given the primary volts are 240v., using Eq. 1 above, we get

$$240 \times A = 80{\cdot}9$$

and $$A = 80{\cdot}9/240$$

$$= 0{\cdot}33 \text{ Amps.}$$

Note to Student: It will be noticed no diagram has been drawn. It is felt that this is one of the few cases where a drawing is of little or no benefit in speeding-up the answering of the question. Secondly, notice that we have referred to the units as VA and not watts. Volt-Amps are more appropriate in this context, as it is a fair assumption that volts and current will not be in phase.

Q.4. With the aid of diagrams, describe how electro-magnetic waves are set up by a simple aerial. *(10 marks)*

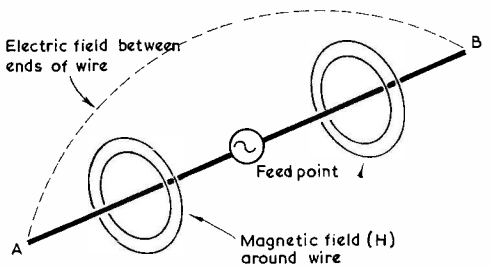
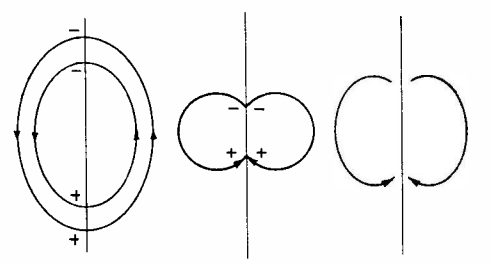


Fig. 2 a. Simple centre-fed dipole showing Electric and Magnetic fields



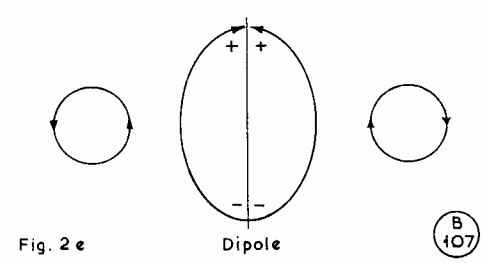


Fig. 2.a. *(To answer Q.4).* **Shows the magnetic field around the aerial wire (H) and the electric field across the ends (E)—see text. Fig. 2.b to e. Showing how the electric field drives energy away from the dipole in separate loops. A similar argument may be used on the magnetic field.**

Answer (4)

Consider Fig. 2. At (a) we see a simple centre-fed dipole fed from an RF source. The current travelling along the wires of the dipole will generate magnetic lines of force around the wire as shown, and as demonstrated in the DC theory section of the syllabus with a vertical wire and some iron filings.

Similarly, there will be electric lines of flux between the ends of the aerial, due to the presence of a positive charge at one end and negative at the other at any given instant in time. These two fields together constitute the "induction field" and have purely local effect. Note that they are perpendicular to each other, and 90° out of phase as the currents and charges are 90° out of phase.

The electric field only is as in Fig. 2 (b) to (e). At (b) we can see lines of flux from one end of the dipole to the other, and note the positive and negative signs; at (c) the aerial has passed the peak of the cycle and the discharging has brought the ends of the lines closer together. When the charges *do* touch, they seem to disappear, and the flux line should also appear to fade away. However, some flux is repelled by other lines closer to the aerial and left with their "heads touching their tails." An instant later, the flux has reversed polarity, and so the new lines of flux repel the loops which are driven off and radiated. This effect is shown by (d) and (e).

A similar argument can be applied to the magnetic field (H) as has just been applied to the electric (E) field. The electro-magnetic field at a distance from the aerial is an amalgam of these two fields, which are 90° out of phase, giving a single sinusoidal field.

When the E-field is perpendicular to the ground, the aerial is said to be vertically polarised; similarly when the E-field is parallel to the ground the aerial is said to be horizontally polarised.

Q.5. Three resistors having values of 50 ohms, 25 ohms and 25 ohms respectively are connected (a) in parallel, (b) in series.

What is the resistance of the combination in each case? What current would flow in each combination when 6v. is applied, and in each case what current would flow in each resistor? *(10 marks)*

Answer (5)

Consider the series case first:

$$R = R_1 + R_2 + R_3 + \ldots \text{ etc.}$$

Thus $R = 50 + 25 + 25$ ohms,

i.e. $R = 100$ ohms.

Look at Fig. 3. Clearly the current is common to all resistors when they are wired in series. Thus we have 6v. wired across 100 ohms. From Ohms Law,

$E/R = I$ amperes, or $E \times 1000/R = I$ milliamperes

Inserting figures, $6/100 \times 1000 = I$ mA

That is, $I = 60$ mA.

Now look at the parallel network, as shown in Fig. 3(b). To find the value of the net resistance, we use

$$1/R = 1R_1 + 1/R_2 + 1/R_3 \ldots \text{ etc.}$$

Inserting figures,

$$1/R = 1/50 + 1/25 + 1/25 = 5/50$$

Whence, by inversion of both sides of the equation,

$$R = 50/5 \text{ or } 10 \text{ ohms.}$$

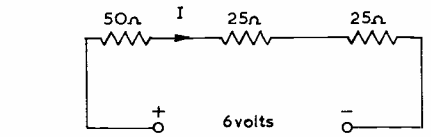
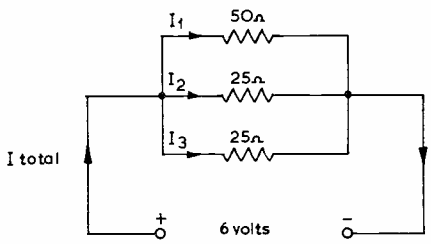


Fig. 3a



See text for calculations

Fig. 3b

B 108

Fig. 3. *(To answer Q.5).* **Shows the circuit drawings and details which should accompany the text if full marks are to be gained.**

Now turn again to the parallel network shown at Fig. 3(b).

A moment's reflection indicates that the total current is the sum of the currents in each resistor, and also that the voltage applied to each resistor is the same, at 6 volts. From this we can proceed.

Consider the 50-ohm resistor. E/R = I.

6/50 = 0·12A, or 120 mA

Similarly, for *each* of the 25 ohm resistors,

6/25 = I = 0·24A, or 240 mA.

Thus the total current is the sum of 2 x 240 mA, plus 120 mA, or 600 mA.

Q.6. Draw the circuit diagram of a three-stage tuned radio-frequency receiver having at least one stage of radio frequency amplification and describe its operation. (10 marks)

Answer (6)

Consider Fig. 4. No values are shown, as they are *not called for.* L1 and L2 are coupled magnetically, and energy picked up on the aerial at the resonant frequency of L2, VC1 (signal frequency), is passed to the grid of V1. This has cathode bias at R3, decoupled by C2, and the screen fed by R1 and decoupled at C1; both screen and anode DC feed are taken through R2 which is decoupled at C3. Signal frequency energy is amplified in V1 and goes from the anode to L3 coupled to L4, the latter being tuned to signal frequency. The grid and cathode of V2 can be looked at as a diode, load of which is R4. Thus AF signals appear across R4 due to rectification in the "diode" together with some RF, and these are fed to the valve grid and amplified. The RF component is decoupled off by RFC1 and C6, the AF component appearing across R5, carried through C8 to the grid of V3. Now return to V2: In the absence of any decoupling of the screen to earth, the anode would feed a certain amount of energy back to the signal grid, resulting in oscillation (positive feedback). In our circuit the "regeneration" or positive feedback is variable, by varying the degree of decoupling of the screen of V2 by RV1. Such a circuit can be adjusted by altering C6 and C7, and possibly, if layout is good, by adding a tiny amount of extra capacity between anode and grid, until operating RV1 makes the valve slide gently in or out of oscillation with no signs of backlash. R6, C5 decouple the anode circuit of V2 from the HT line. V3 receives its AF as already explained, developing it across R7. Grid bias is found at the cathode, by R8, C9, and the screen is coupled direct to the HT line, as output valves are usually designed for this mode of working. In the anode circuit can be placed a large

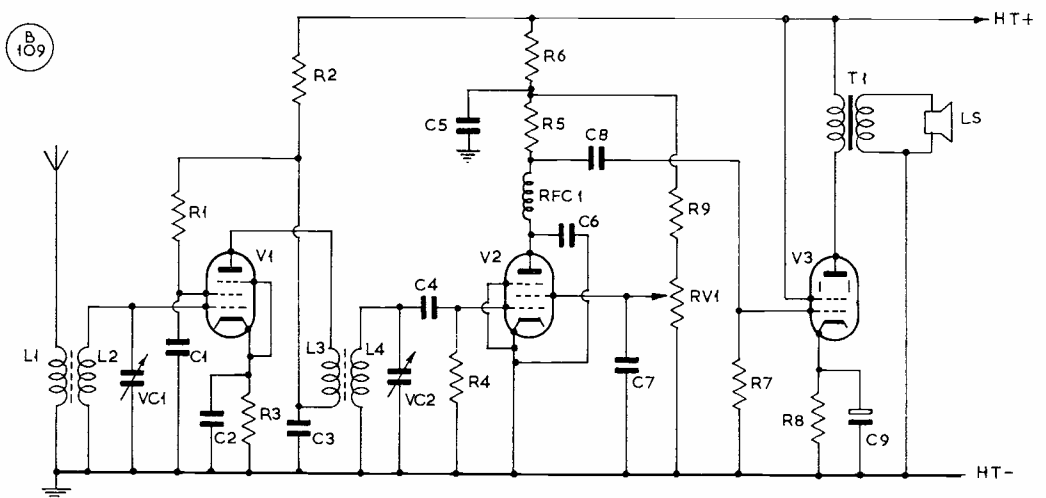


Fig. 4 Circuit Diagram of Three Valve TRF Receiver

Fig. 4. *(To answer Q.6).* **Note that the circuit given must include one RF stage at least to gain full marks. Observe that no values are called for, and should not therefore appear on the drawing. If there are any critical values they can be mentioned in the text.**

AF choke, with capacity-coupling to headphones, or, as shown, output transformer T1, matching the optimum load of the valve to the impedance of the speaker. The turns ratio for this transformer is given by $n = \sqrt{Z_p/Z_s}$ where Z_p is the output valve optimum load in ohms, and Z_s the impedance of the loudspeaker.

Q.7. What is meant by the terms "mutual conductance," "amplification factor" and "AC resistance" as used of a thermionic valve?

Describe the construction of a pentode or beam tetrode valve suitable for use as the final amplifier in an amateur sound transmitter. (*10 marks*)

Answer (7)

Mutual conductance can be expressed as the rate of change of anode current with change of grid voltage, anode voltage being kept constant. It is measured in mA/V, or in millimhos (American).

Amplification Factor is the rate of change of anode voltage with change of grid voltage at constant anode current. This ratio is called μ(*mu*).

AC resistance is the rate of change of anode voltage with change of anode current at constant grid voltage.

From the above it can be deduced that these three parameters are coupled by the relationship

$$\mu = g_m r_a$$

Consider the sketch at Fig. 5. This shows a beam tetrode construction from outside, and a larger cutaway view of the inside. The cathode is shown with the heater wires running up inside it, insulated probably with ceramic; then come the first and second grids, known respectively as control and screen grids, and finally the anode and beam-forming plates, the latter connected electrically to the cathode. The anode and the beam-forming plates must be considered together, as the relationship is critical for the beam plates to operate in checking secondary emission putting a "kink" in the grid characteristic of the valve.

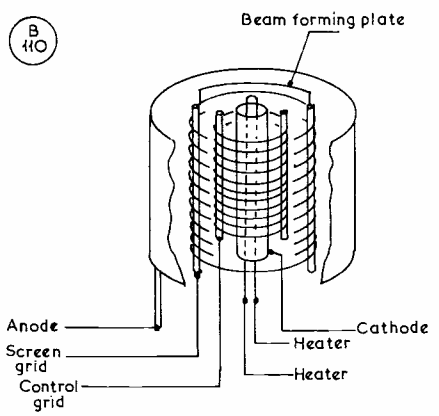


Fig. 5 Construction of a Beam Tetrode (see text).

Fig. 5. (*To answer Q.7*). **This shows a cutaway view of a beam tetrode. A good drawing of this has appeared in every edition since 1939 of the "RSGB Handbook," and tracing it will give practice at this sort of thing. If one is slow at drawing, a pentode may be found quicker to sketch.**

Because of pressure on space, answers to Questions 8, 9 and 10 of the 1971 R.A.E. are deferred until next month.

Note for Candidates

For those concerned, copies of the R.A.E. Question Papers for the years 1969-'70-'71 are available as one set price 15p, and the syllabus for Subject No. 55 is also 15p (all post free), from the Sales Section, City & Guilds of London Institute, 76 Portland Place, London, W.1, quoting "Subject No. 55." Also obtainable, free of charge, is the Post Office pamphlet *How to Become a Radio Amateur*, covering the conditions for the issue of a U.K. amateur licence; you can get it from the Ministry of Posts & Telecommunications, Radio Regulatory Division, Amateur Licensing Dept., Waterloo Bridge House, Waterloo Road, London, S.E.1. Following is a suggested list of books, obtainable from us, and suitable for R.A.E. study and reading: *Amateur Radio* (£1·35); *Guide to Amateur Radio* (47p); *Radio Amateur Examination Manual* (41p); *Amateur Radio Techniques* (£1·13); *ARRL Antenna Handbook* (£1·38); and for a standard text on the principles and practice of Amateur Radio generally, the *Radio Communication Handbook* (£3·50). This list constitutes a library covering the immediate reading requirements of anyone aspiring to an amateur transmitting licence and also embraces the practical work involved in getting a modern AT-station on the air, with a lot of useful reference data to keep any licensed amateur interested and occupied for a long time to come. Prices quoted are post free, from stock for immediate delivery (normally by return) and orders with remittance should be sent to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, SW1H-OHF.

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"VHF BANDS"—CORRECTION

On p.684 in this issue, right-hand column 6th line up from bottom, for "countries" read counties, and on 3rd line up for "CW" read CQ.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here will be reprinted in the U.K. section of the quarterly supplements to the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

GM4AGU, Glasgow University Radio Club, c/o P. G. Bower, Dept. of Electronics and Electrical Engineering, The University, Glasgow, W.2.

G4AGZ, W. D. Hutchinson, Langdale, Carn Close, Leedstown, Hayle, Cornwall. (*Tel. Leedstown 419.*)

G4AJG, P. E. Perera (*ex-4S7PE*), 42 Leinster Square, Queensway, London, W.2.

G4AMP, B. M. Flack, 20 Whitley Road, Yateley (Hants.) nr. Camberley, Surrey. (*Tel. Cricket Hill 4815.*)

G4ANE, H. Leach, 30 Taywood Road, Thornton, Blackpool, Lancs.

G4ANF, W. R. Cartlidge, 73 Main Road, Wybunbury, Nantwich, Cheshire, CW5 7LS.

G4APR, S. Ockelford, 43 Great Lane, Bierton, Aylesbury, Bucks.

G4APS, D. Fiander (*ex-G8ELJ*), 37 Higham Road, Rushden, Northants., NN10 9DG.

G4AQH, D. Harrod (*ex-G8ENU*), 198 Mersham Road, Thornton Heath, Surrey, CR4 8NR.

GW4AQR, I. Cordingley, 85 Garth Road, Bangor, Caerns.

G4AQT, J. Rowbotham, 1 Holkham Avenue, Chilwell, Nottingham, NG9 5EQ.

G4AQZ, G. M. Axford (*ex-G8EYF*), Dorfolk House, Landermere, Thorpe-le-Soken, Clacton-on-Sea, Essex.

GM4ARG, Gordonstoun Amateur Radio Society, Gordonstoun School, Elgin, Morayshire.

G4ARI, T. K. Raven, 69 Leicester Road, Glen Parva, Leicester, LE2 9HJ. (*Tel. Wigston 2655.*)

G4ARO, T. C. Covey, Marston, Vicarage Lane, Horley, Surrey, RH6 8BA.

G4ASK, E. G. Rayland, 26 Coleridge Crescent, Taunton, Somerset. (*Tel. Taunton 81508.*)

G4ASL, S. G. Ayling, The Small House, Lenten Street, Alton, Hants. (*Tel. Alton 82125.*)

G4ASQ, M. P. Jordan, 89 Stanhope Drive, Horsforth, Leeds, Yorkshire, LS18 4EU.

G4ASV, M. R. Kenyon, 6 The Avenue, Knaresborough, Yorkshire, HG5 ONL.

G4ASX, O. V. Perry (*ex-G8AUQ*), 49-A Cissbury Avenue, Peacehaven, Newhaven, Sussex.

G4RG, Radio and Electronics Society, Queen Mary College, Mile End Road, London, E1 4NS. (*re-issue*).

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G8FFV, J. R. Birch, 61-A Church Lane West, Aldershot, Hants.

GW8FGC, K. Johnston, Cliff Walls, Marine Parade, Penarth, Glam. (*Tel. Penarth 709322.*)

G8FHO, Mrs. Linn Boast, Flat No. 7, 99 Thorne Road, Doncaster, Yorkshire, DN1 2JT.

G8FKM, B. P. C. Hitchins, 66 Buttermere Road, Burlish Park, Stourport-on-Severn, Worcs., DY13 8NX. (*Tel. Stourport 4877.*)

G8FNB, R. N. Canty, 9 Rectory Close, Godalming, Surrey. (*Tel. Godalming 6814.*)

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