The SHORT WAVE Magazine

30p

VOL. XXXII JANUARY, 1975 NUMBER 11

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GENERAL CHAT

Well, which way will amateur radio go in 1975. There seems to be no shortage of new licencees so we could have even more crowded band conditions than ever. This means that each amateur must "keep his house in order" with respect to his signal, since it is just bad manners to splatter your signal across the next door QSO. Inevitably more attention will be paid to producing lower and lower intermodulation products in the transmitter and a closer watch must be kept on signal width. The use of better filters (i.e. 8 pole rather than the common 6 pole) in the transmitter will almost become a necessity and overdriven TV line output PA tubes will have to be under run before they become acceptable.

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SHORT WAVE MAGAZINE

(GB3SWM)

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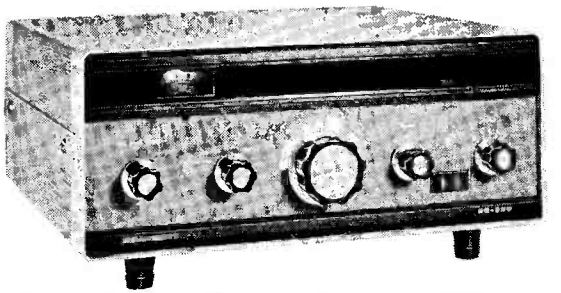

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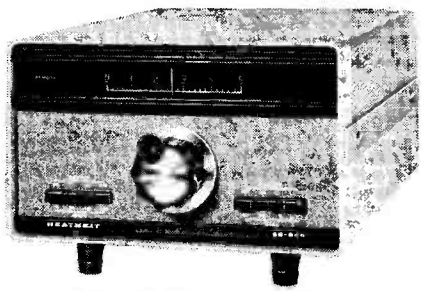

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The SHORT-WAVE Magazine

EDITORIAL

Prospect

It is again the season for Sound Advice and Good Resolutions—and it hardly needs saying here that in our world of Amateur Radio much useful advice could be given and a long list of excellent resolutions could be catalogued.

It is widely held that nowadays radio amateurs use more commercial equipment than gear they design and build themselves. Certainly, whereas 30 years ago it was essential to home-construct much of one's apparatus, today there is no need to build anything at all—it can all be bought off the shelf, ready to go on the air. There is nothing wrong with this; indeed in many ways it is a very good thing that such an approach to Amateur Radio is possible.

But as always, amateurs will remain individualists who pursue a great hobby as the spirit moves them—they are not really much concerned about what others may be doing, thinking or building.

So instead of offering advice for the New Year to those who may glance over this page, we would simply say that we wish all our readers, all over the world, the best of luck, happiness and good fortune for the coming year, and success in whatever direction their amateur activities may lead them.

And to all our readers and trade friends
— at home and across the seas —
Every Good Wish for the New Year

Austin Forsyth
G6FO

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

DECEMBER 9, we said would be the deadline for this piece; but various factors have conspired to require that copy had to be in before much of the correspondence could possibly be included—so it's somewhat a case of "bricks without straw" this time.

But maybe this is no bad thing once in a way, if it leaves space for reflection, and for the contemplation of the overall picture.

Equipment seems to keep much as it has been for some years, barring a trend for the amateur fraternity to look with a little less suspicion on solid-state and hybrid apparatus including integrated circuits. The popularity of the high-power American rigs of about 300 watts output is a bit hard to understand unless one is going to dispense with a linear, as the power gain to be obtained with the linear is so small—agreed one can reduce the drive in the transmitter but while this brings you down to the legal input, it also is a way of getting rid of some carrier and Sideband suppression—which is *not* so good.

The widespread use of the transceiver as the station rig, and its lack of facilities for adequate CW reception, have made the advent of clip-on accessories for better CW reception—the MFJ active audio filter, for example—into a Godsend for the operator who wants to go on taking CW but is not one of the lucky few who possess "crystal-filter ears." On the SSB side, there have been many who have realised the advantage of some speech processing, both in the business of getting increased "talk-power" and in the (probably even more important) matter of keeping the outgoing signal down to a pretty civilised bandwidth. One cannot but *hope* that no-one will be so misguided as to use any clipping on a SSB rig other than by RF means—apart from generating enough crud to make his own signal less readable, he is almost certain to be adding some splatter on adjacent channels.

Aerials: Every DX chaser realises how important it is to do one's best in this respect but it still does not appear to have been thought particularly important when looked at from the point of view of the planning-permission business. Surely it is about time for this problem to be at least rationalised. The planning authority attitude seems nowadays to be roughly this: "In general, to throw out any planning applications on Amateur Radio aerials; and where one cannot scratch up enough of a case for refusing permission, then ensure that the restrictions on the structure are such as to make it useless for its intended purpose. Meantime, let us turn a blind eye to all those telly aerials that are put up without permission, lest we planners have to apply for our own illegal telly-aerials to be permitted—after all, telly is *fashionable*, unlike that *dreadful* Amateur Radio which causes people to *think* sometimes." Rather, the attitude of planning officials at national and local level ought to be to grant permission for radio amateur masts, towers, and aerials *automatically* (subject only to *very* special cases, where the onus shall be to show a good cause for refusal, rather than requiring the applicant to show reasons for wanting such an aerial), up to a height of, say, fifty feet.

What we also need is to have the sunspot cycle advanced a couple of years! And on that note let us take our monthly look around the bands and the people who use them.

G4DMN (Shrewsbury School) is a refugee from Justin Cooper and his piece; another way of saying that he is a chap who has spent his apprenticeship with the receiver before getting his call, so he knows the way of things. Richard has a KW-2000B at Shrewsbury, used mainly to work Eighty and to keep his sked with father, G4DHC. However, to date the DX has refused to come back to any significant degree from the /A location at Shrewsbury although some success has been had from Parkgate, Wirral, using the G4DHC equipment. It sounds like a sad story of aerials that won't play—but before G4DMN can apply himself to the problem in great detail, there is a small matter of some examinations to be passed . . .

Those lucky(?) souls among you who had the good fortune to work "3A2GX" should note that he has been operating from France and not Monaco. He was closed down at 1800 on October 26 by the French authorities, who confiscated the logs; ITU have, we are told, passed the news of this little escapade to ARRL. Doubtless many a score will take a step downwards by one.

You may recall the Nauru DX-pedition earlier in the year, by JA1OCA operating as G2IDX; his QSL card turns out to be rather nice with pictures of the island, the expedition and a map, some notes on what it was all about, and the QSL data itself, all so arranged that the card would go into a normal envelope and so would not be damaged in transit.

Did anyone work LA1SH/BY?? There seems to be a lot of circumstantial evidence being quoted on this one, but as of this moment nothing solid enough to make this old scribe feel sure of his status—which may yet turn out to be good.

ZL2AFZ is a fairly well-known call on the bands, and at one time used to be on Chatham Is.; we now hear he had a motor-car argument with a power-line pole which modified both pole and car somewhat and needed the fire brigade to extricate ZL2AFZ. Luckily, his XYL who was with him was not so badly knocked up. Good wishes for his health and recovery could well be routed to his home QTH, all-same *Call Book*.

If you worked ON4AXA/MM you hooked up with a group on a raft drifting from Morocco across the Atantic toward Trinidad in the equatorial current—they should, if all goes well, have reached the end of their journey round about the time this piece makes the bookstalls.

Reverting to pirates, did you hear about the "SV1ZZ" type just recently—seems he changed to VP2JR when the going got a bit rough—and all the beam headings seem to indicate this "Fred Phoney" lived in the Caribbean.

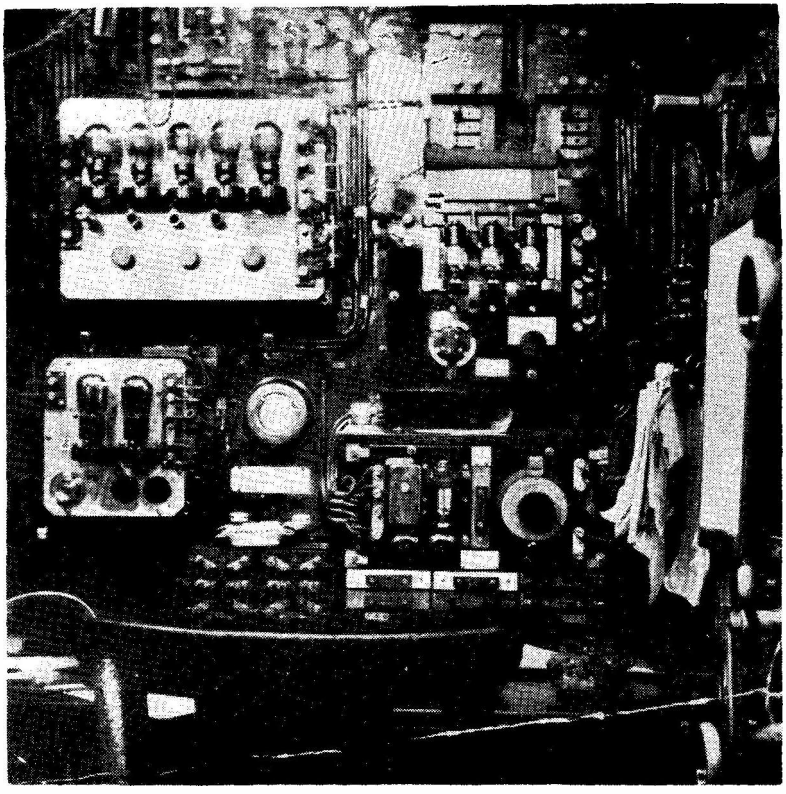
No wonder the band conditions are getting pretty abysmal; Zurich gave the following sunspot data: January 1975 looks like being 22.

Round about when this piece comes to be read, is about the time, we hear, that VS5MC will be opening up from Spratly Is., it having been agreed that any of the nearby reefs will be good enough to count for this one; so keep your ears peeled.

If you lack a contact with Volta, drop a line, with an s.a.e. to W1AM; his son is XT2AA but hates pile-ups. W1AM will tee things up for a sked with XT2AA, and also handle the QSL chore.

Quite a few people have expressed some doubt about the 9H1 calls heard on Top Band. It is now understood that the 9H1 lads are once again licensed for Top Band, as and from the end of September 1974. However, the fact that this re-opening of 160 metres to the

Brian Rix, G2DQU/M, was at Leicester on the Doram stand for the recent ARRA exhibition. In the car, he runs a Yaesu FT-42 covering the 10-80m. bands, operating mainly mobile on his way to and from the theatre.



And what, you may ask, does this somewhat prehistoric - looking picture represent? Actually, it is of considerable interest, being the radio room ("wireless office", as it would then have been termed) of H.M. Submarine "Perseus", in service on the China Station round about 1932. The point is that out there the ship could receive, while submerged to 30 feet, good signals from Rugby Radio transmitting on the 16 kHz frequency, 18750 metres, the GBR Tx putting about 700 amps RF into the aerial system, still to be seen today on its 800ft. masts. The picture was sent in by SWL A. E. Glass, 152 Churchway, Plymouth, wireless operator of "Perseus" at the time.

9H1's was not publicised seems to have resulted in them calling for hours and getting no reply. However, let us hope business picks up for them—old 'KFE could do with a 9H1 QSO on Top Band.

Correspondence

GD4BEG (Sulby) has a long letter with much interest. Mike has just done a complete rebuild and is now operational with a home brew CW/SSB/AM/FM rig for Top Band; his aerial is an interesting arrangement and seems very effective. Basically things start from a third-floor window, rise to chimney-pot level vertically and reach about 55 feet, and then run 100 feet out to an opportune tree. From there it falls vertically to the fifteen-foot level from fifty-five feet, and returns at fifteen feet above ground to be bent upwards and back to the shack window. Normally, since there is no earth worth calling one available, the upper leg is connected through a parallel-fed ATU, putting the high-current section into the vertical at the end of the garden. This seems to get out well to DX. However, when high-angle radiation around U.K. is required, the thing can be energised as a loop, fed through a toroidal transformer as a matching device. As far as DX QSO's go, we notice such as VK6HD worked, lots of North Americans, 9H1, OD5IQ (who broke in to a contact with PAØHIP), DJ2VK at 1448(!), 4X4NJ around tea-time and ST2AY, who was finally raised after calling for two hours. On a different tack, Mike says he doesn't think European or inter-U.K. contacts could be counted as DX in any way! Of course, this all comes back to the question of what one's personal definition of DX is. Clearly, for GD4BEG on Top Band, the world is his oyster. But for many chaps who for good enough reasons cannot radiate a beefy signal, a 160m. QSO with GM is DX in the highest sense of the word. Anyway, the definition of DX attraction in terms of sheer distance probably was dead as early as 1930 as by then there had been the first all-continents net QSO. DX is what you personally make of it, and our ladder is aimed entirely at enabling the "tiddlers" to enjoy themselves competitively with the Big Ones.

As far as G3KFE is concerned, one of the most interesting exercises to do with Top Band has involved the attempt to alter an old TW "Communicator" from positive-earth operation to work on a car with negative earth. Switching round the two polarities proved to be pretty simple, and the transmitter side goes as well as ever, but the receiver AF module seems determined to motor-boat just as soon as its input lead from the volume control is given a DC path back to earth—and no amount of decoupling, bad language, or even gentle rebukes, will persuade it to play fair!

G2BJY (Walsall) and your scribe have for long been correspondents, and occasionally we think of matters radio. For one thing, the interesting quirks thrown up by the revised counties, as for example G8IB is now in Oxford, not Berkshire. Geoff's score in the Top Band ladder is a demonstration of what someone with a small, hemmed-in QTH and no ways of stretching an aerial beyond can achieve, given some application of thought to the problem. However, he would still like to know how the big ones brew up their signals; perhaps the GD4BEG letter just quoted will inspire others to explain just how they do it, "it" being different in almost every case, due to the length of wire involved in creating a dipole for the band. On an entirely different subject, we have been debating the relationship between the old 10-watt AM signal and the maximum power allowed to an SSB station. G2BJY argues, and rightly, that an AM transmitter couldn't be *linear* up to 100% modulation, so the power comparison in the rules is to that extent fallacious, favouring the SSB chap even more than the theory would predict. However, this argument sent G3KFE back to his books, and he finds that 100% linear modulation in the AM mode *can* be obtained, to better than 1% accuracy. The magic circuit that did the trick is the so-called "triple-triode modulator" originally devised by Murray Crosby to go with his first product detector which made such an impact on the amateur scene He claimed that a distortion, in AM, of less than 1% over the system transmitter to receiver, was attainable; and your scribe tried it, wound it up to 100 per cent and looked at the output on a spectrum, analyser as a double check. But the old plate-and-screen modulator of our amateur rigs of yore would rarely better 70% modulation without beginning to go non-linear and spreading. An odd point is that the triple-triode device can be used as a transformerless balanced modulator too, suitably adjusted!

G3LIQ (Hull) reckons November to have been the best month for Top Band for a *very* long time. For him, November 9 was the start, when G3LIQ worked 4S7GV, who said he had also heard EI8H but the latter had failed to respond to his calls. If you want to try for a 4S7 contact, Glen is on during 2330-0030z daily. Going on a bit,

November 13 was *the* day, when the band opened at 2307z, and nine W's, VE1MX, VE1CD and VP8NP were worked. On the Sunday mornings of November 17 and 24, many stations were heard, but the skip appeared to be one-way, favouring the W's; however, looking eastwards one could find and work ST2AY, 4X4NJ, OD5IQ and ZB2EZ.

The QRP signal from G4AYS (Moira), all 600 milliwatts of it, has now managed to penetrate as far as GM, GW and GI, not to mention a call from OK1MMW who gave him a 449 report. All credit to the OK station, who was doing what good operators do, in *listening* for the weak ones and working them; but to say that in no wise detracts from the fact that G4AYS with his tiny power and rockbound on 1844·79 kHz can get all round Europe with no real effort.

G5BIU (St. Mary's, Scillies) makes a start by pointing out that his last mention turned him into G5IU; it seems to have occurred somehwere along the line and not been spotted—but, luckily, a look in the 1975 U.K. *Call Book* says there isn't a G5IU in use now. David is at 35 countries worked on Twenty with the little two-watter—nearly up to DXCC, as G5BIU optimistically puts it. Another activity there has been Top Band, with a few QSO's recorded, so at last the island is represented again on the band. On the darker side, David's FT-101 hasn't arrived yet, and so he is on the lookout for an FT-75 or similar; any offers can be passed to the writer who will forward them immediately, if G5BIU also sends in a quick card with his Scillies address, so we know where to send 'em! (A wonderful, thing the G3KFE shack filing system; it quite happily keeps receipts and tax demands and suchlike junk for years, but give it an important QTH and an address-book to record it in—and it promptly loses it!).

Still with G5BIU, it seems he, G3UUZ ("Andy the Light") and G3RPC are planning to put on a special station to commemorate the

Picture of the Bishop's Rock Light, about 27 miles south-west of Land's End, at low tide—of particular interest in our context because it is now the QTH of G3UUZ, "Andy the Light", a principal keeper in the Trinity House service. Duty is one month "on" the Light then one month "off" at St. Mary's, Scillies. His Ae. is a 60ft. vertical wire, down the side of the Lighthouse, with the tower lightning conductor as the earth.

100th anniversary of the sinking of the steamship *Schiller* near Bishop Rock—there will be one station on Bishop Rock, and another in St. Mary's.

G3NOF (Yeovil) writes to say that he has been off the air since the back-end of October due to illness, which accounts for his absence from this column. Your scribe must say that Don's regular and analytical reports on the bands each month have been a mainstay ever since he took on this piece in July 1966—so it is now over 100 times that G3KFE has been stirring up the DX mud!

Having got his 18AVT down to his /A QTH at Bristol, G4CXM/A found it didn't seem to do at all well there, so it had to come down again. The very low dipole, the alternative to the vertical, seems to be a bit like the curate's egg in its performance, with its good days and its "off" ones. Although most of the contacts were on CW on 14 MHz, the only one of interest was with W4VNE, who was, surprisingly enough for a W, using the good old long wire for an aerial. SSB was rather more fruitful, and produced reports from ZS6APO, ZE1CQ, VK3UB, DJ6QT/CT3, HI8XKP, UW6FZ, IA5TEZ, EA6BG, 9H4H, VE7JK, 9J2BO, ZD3G, ZL1AMO and VP2VBK. This brings the countries total up to 130, albeit the first 100 were knocked off in four months from starting to compile the scores.

A new correspondent is G4BOH (Bury) who puts in a Table entry showing all modes AM/CW/SSB. Chris started with a KW Vanguard, but after reading our test report on the HX-50 back in October 1964 he decided to "take the plunge" and, like the rest of us, went through the period of surprise at the remarkable difference in one's "service area" on Phone, particularly after dark. On the receiving side there is the old CR-100—the Mighty Marconi, not the Junky Japanese—which has been somewhat operated-on, plus a 140-foot wire at 30 feet. Like the majority of those who have commented, G4BOH reckons the Top Band table to be a good thing to increase the activity on the band. The Top Band Table will reappear next month.

* * *

G2NJ (Peterborough) often finds little snippets of interest, and this time his labour-of-love in connection with the Antique Wireless Preservation Society turned up some interesting facts. Back in 1930, G5UM reported the results of some tests between him and G2ZN, the latter maintaining the QSO with an input as low as *five milliwatts*, the distance being from Walthamstow (G2ZN) to Muswell Hill (G5UM). Of course, both these operators are still very much with us today, G5UM being well-known for his VHF activity of recent years, and G2ZN that was is now G2HR, Eric Johnson, very well known in the Club world, particularly with Silverthorn. G5UM, when Nick wrote to him about this, also mentioned the early Trans-atlantic Tests (which of course still run today, and still with WIBB spark-plugging things on the other side), adding that it was all done with far simpler gear than is used today; first across on 1·7 MHz was G6FO, then at Newport, in 1931, followed by G5WU of Penarth, and later G6GM from North Devon who, with wet batteries and a wind-charger, used to get over every winter. G3KFE recalls that well after the War, G6GM was still running with his batteries-and-charger set-up from Holsworthy, miles away from any power lines, using an old HRO modified to work off fifty volts DC, with which set-up he was certainly the first G, and possibly the first ever, to make all continents on Top Band. This first WAC would have been somewhere around the early fifties, if memory serves. And, to cap it all in the cause of a bit of nostalgia, it was a G5UM Top-Band transmitter/modulator which was the first box-of-tricks G3KFE tried to build; a thing called the "No-Cost Five" of September 1947's issue of *SHORT WAVE MAGAZINE*.

Our last letter in the clip comes from G3ZYY, aboard H.M.S. *Argonaut*, writing to say he is still in existence though temporarily inactive. Recently they have been up the north coast of Norway, and some listening was done on Top Band. Innumerable stations were heard whilst around the Shetland area, the strengths falling away as they got further North. A listening watch from 0030-0130z on November 10, the location being about 72°N. 25°E., some 1300 miles from London. Hi-Fix on 1·9 MHz was S5, DHJ 579. The amateurs heard were GM30LK, 589; G3YUV, 589; GM4ACG, 579; G3RXH, OK1KPU, OK3YDO, PA0HIP, all 569; G3LIQ, G3UBR, GM3YOR, OK1ATP, OK1MCW and OK2PAW, all 559; G6BQ, G3YRZ and G4CXP, all 449; and G3BFP, 339. It is of interest that about half-way through the period a quick check on Eighty produced no signals whatever. Also heard down the bottom end of Top Band on Sunday evenings at 1045z, was VS6DO, looking for European QSO's. Equipment, the ship's B.40 into an untuned 30ft. whip aerial. Trev reckons to be back at home for the latter-end of December and the January DX season, and then goes back to sea again.

Here and There

Once again, old Samuel's Morse code has been found useful in

Group seen in the "Granby Arms", the bar at the Leicester ARRA Exhibition—left to right: G3XKB, G3XDU, G8IWV, G8CDV, G3YQT, G3FWA and G4BYX. This picture was taken on the Friday of the Show, November 1st.

the modern age. Using the ATS-3 geostationary satellite, and an aerial comprising a two-turn helical mounted on a golfer's brolly, an American GE engineer with a five-watt transceiver showed how he could communicate, by sending his message in Morse, *via* the satellite, to the GE Radio-Optical Observatory near Schenectady. Having received the message, the observatory went over to voice to reply, also over the satellite. *Just* like Oscar! However, in this case there was an interest in demonstrating that the satellite could be used, with QRP gear to make a practical search-and-rescue system, where the downed aircraft or whatever would receive a reply by voice, telling them the signal was received and also giving rescuers information on where to look. It seems the basic idea could be implemented on a world-wide basis—saving the polar regions—by six geostationary satellites mainly occupied in handling other traffic. It would give the rescuers a very accurate fix on the location of the casualty. It is interesting to note that the demonstration was done at a time when a very strong signal was known to be going through the satellite, and no mutual interference resulted.

A rather more sombre note is presented for consideration when we read that *RCA* are pulling out of microwave transistors and *Motorola* are laying off people all over the world as markets slump in the electronics field. This process, if it continues, could well see us back into the era of "home-brew or no rig at all" as far as Amateur Radio goes. Most companies in the market are running at very low profit margins or even at a loss, carrying the Amateur Radio side on the back of the more profitable commercial business, and already we have seen how many of the "traditional" American suppliers to our market have given up in face of Japanese competition. If the Japs are likewise forced into giving up, then we will be in for a thin time, and in any case it seems inevitable that prices for our sort of tackle will rise rapidly in the next few years. Who knows, we may yet see AM operation return in force to our bands—and much more home-construction of the simpler CW transmitters.

Finale

That's it for another month anything that came in too late to be included will be picked up next month, along with its own offerings, the deadline for which will be January 14, 1975, addressed "CDXN," *SHORT WAVE MAGAZINE, BUCKINGHAM, MI8 1RQ.* Meantime, your scribe would like to thank those who have supported this piece through the year, and those who have read it—also those who sent their personal greetings either by letter or card for which, many thanks. 73, *and CU next month. HNY!*

SOME CLUB HISTORY

Looking over early records, we find that in 1928 the Clubs then listed with their own callsigns were as follows:

G2CP: Wolverhampton & District Radio Transmitters' Society (*no QTH given*).

G2OT/G2OU: Ilford & District Radio Society c/o H. O. Crisp, 2 Ramsey Road, London, E.7.

G2MV: Malvern College Radio Society, Malvern, Worcs.

G2IY: Hampstead & St. Pancras Radio Society (*no QTH given*).

G2TU: Radio Transmitter's Union of Northern Ireland (*no QTH given*).

G2FZ: Radio Experimental Society of Manchester (*no QTH given*).

G2SN: Sunderland & District Wireless & Scientific Association (*no QTH given*).

G5FT: Felstead School Wireless Society, Felstead, Essex.

G5DP: Whitgift School Scientific Society, North End, Croydon, Surrey.

G5FZ: Lincoln Wireless Society, Technical School, Monk's Road, Lincoln.

G5LL: Manchester Radio Society, 155 Oxford Road, Manchester—also G6MX at 66 Oxford Road, M'cr.

G5TK: Torbay & District Wireless Society (*no QTH given*).

G5TT: Tottenham Wireless Society, 42 Drayton Road, Tottenham, London.

G5UN: Birmingham University.

G6AJ: Barnsley & District Wireless Association (*no QTH given*).

G6JB: Wimbledon Radio Society, 11 Montana Road, Wimbledon, London, S.W.19.

G6NC: Stoke-on-Trent Wireless & Experimental Society, 19 Jervis Street, Heron Cross, S-o-T.

G6UM: Leeds Radio Society, Woodhouse Lane, Leeds.

G6YA: Bradford-on-Avon District Radio Society (*no QTH given*).

G6YM: Belfast YMCA Radio Club, Wellington Place, Belfast, Northern Ireland.

The foregoing information, such as it is, has been extracted from our (vintage) copy of the *Radio Amateur Call Book* for 1928—which in those days was priced at 85 cents, about four shillings. The paucity of fact underlines the importance of today's Radio Clubs and Societies organising themselves to keep accurate records and minutes, handed on from secretary to secretary. We would hazard a guess that only about three of the afore-mentioned Clubs still existing in the areas they cover are today aware that they had "a previous existence" nearly 50 years ago. A source of information could be file copies of the local newspapers of the time, or the records of the public library.

The Telford Communications stand at the ARRA exhibition at Leicester. The principal of the firm is J. C. Oliver, G8ARS, and much of the equipment they offer is to his design.

One of the smaller but most successful stands at the ARRA Exhibition was that of Datong Electronics, showing what is becoming their well-known RF speech clipper. On left, G8ENO, with G8ENN, principal of the firm. The performance of the Clipper was convincingly demonstrated on the oscilloscope.

Above: G8ARS of Telford Communications, Bridgnorth, was at the ARRA show at Leicester with his new Model TG-10 solid-state multi-mode transmitter, as advertised in the "Magazine". At left: One of the interesting small stands at the Exhibition, Tilcock of Caterham, Surrey, specialising in a wide range of small tools. "Dan the Tools" is also G8DWM on the air.

FEEDING A DIPOLE FOR TWENTY

POSSIBLE CONFIGURATIONS, AND THE SWR FACTOR

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

THOUGH the points considered here relate particularly to aerials for the 14 MHz band, they do of course likewise apply to the other amateur frequencies. Some of them also bear on the use of such aerials for reception, as well as transmission.

A correctly arranged dipole of this type can always be expected to give a good account of itself. It is in fact a popular aerial for use with a transmitter or transceiver, and is worth having on the grounds that it is sure to prove to be convenient and successful.

The Dipole

The original type in view is shown in Fig. 1, though this can be subject to some variations. The top, or radiating section, is a half-wave long at the operating frequency. As a result, the distribution of voltage and current gives a centre impedance of around 75 ohms, so the aerial can be cut here and a 75-ohm coax feeder can be attached.

The top length is that from one loop to the other, as shown. This length is important and will need to be accurately measured. For best results, it is placed high and clear of obstructions.

The feeder length itself is not important, and need not be known. This length usually depends on the location of aerial with respect to the equipment. The feeder may run along the house wall, or be situated as convenient. To avoid unnecessary parallel feeder currents, it is best that the feeder run away from the aerial at right angles for some distance. Parallel feeder currents are not very likely to cause trouble unless the feeder is inductively coupled at the transmitter end and the feeder length plus one-half the top corresponds to a half-wave or multiple of half-waves at the working frequency. Thus suitable feeder lengths in these circumstances lie from about 22ft to 42ft., or 54ft. to 77ft.

The co-axial feeder can be plugged directly into the transmitter (or receiver), or into a 75-ohm low-pass filter, or into some form of SWR indicator, in turn connected to the transmitter by any convenient length of similar feeder.

Materials

A dipole centre-piece or "T" (as obtainable from aerial equipment suppliers) is preferable for the middle. Two ribbed or egg insulators are also necessary, and stout polythene line is ideal for supporting purposes.

Hard drawn 14g. enamelled single strand wire is probably best for the top, 16g. also being suitable. Stranded and covered wires such as 7/26 can be used but appear to deteriorate. Low loss normal or heavy-duty co-axial cable can be used, the latter only being justified when the power makes it necessary. Lightweight feeders are suitable for receivers or low power.

Making Up

An open space which will allow the top to be stretched out for measuring is helpful. At the centre, scrape about 2in. clear of insulation, thread the wire through the centre-piece arms, and twist the ends. Remove the outer insulation from about 3in. of the feeder cable, unpick the outer brading, and cut the inner insulation off for about 1in. Twist the braid wires into a pigtail, and solder to one section of the aerial, similarly soldering the inner conductor to the other section. Solder also the twisted ends of the wires. A reasonably large iron is most suitable. Clamp or bind the cable to the centre piece, according to the means provided, to take strain off the connections. Alternatively, use screwed cable connector sleeves, liberally coated with *Bostik*, to make the outside connections.

The co-axial cable must be sealed so that moisture cannot enter. This can be done with "Seelastik" (*Expandite*) or similar compounds, with a wrapping of vinyl tape over the whole, cracks again being filled with compound.

The aerial can then be strained between two pegs or other fastenings, and the measurements checked. The length of each top section should be identical, and the overall top length correct. Allow a little extra (say 2 to 3in.) each end, to pass through the insulator and twist. All twists or joins should be soldered.

Top Length

This is calculated from 468/MHz. So 33ft. will have a "centre resonance frequency" of about 14·18 MHz.

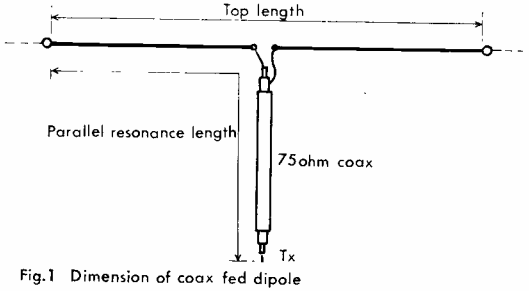


Fig. 1 Dimension of coax fed dipole

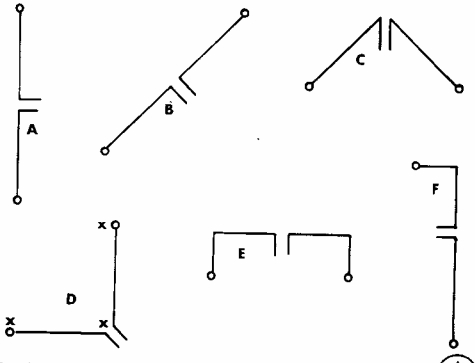


Fig. 2 Other methods of arranging the dipole

A 597

Dipole configurations as discussed in the text

Should we need to modify this, the change in length will be about 3in. (1½in. each end) per 100 kHz. Thus about 33ft. 4½in. brings the frequency down to the CW end of the band.

However, local effects such as the height above ground and other factors slightly modify the resonance frequency, so initially a little adjustment by trial and error may be necessary.

Assuming the SWR can be checked, ideally this will be 1 : 1 at the design frequency, rising a little LF and HF of this. Tests can be made at 14, 14·1, 14·2 and 14·3 MHz. Should the lowest SWR be at 14 MHz, it is evident that the aerial is a little too long, and this can be corrected by pruning equal pieces off each end. On the other hand, if the SWR is lowest at the HF end of the band, the aerial is a little short.

As the aim is normally to operate the aerial directly from the transmitter (*via* the SWR indicator and filter if present) the SWR needs to be low—preferably under 1·5 : 1 throughout the range of frequencies to be used. Once this has been arranged, it is merely a matter of adjusting the PA tuning and loading controls for the usual input.

If no SWR indicator is available, then the need to prune the aerial may be shown by the transmitter loading normally at the LF end of the band, but not towards the HF end. If the reverse is the case, the aerial is too short. It may be necessary to exercise some care, as with some equipment components in the PA stage may be damaged if the SWR is too high.

Other Positions

The aerial in Fig. 1 requires two supports, such as two poles, or house and pole. Basically, the same type of aerial can be put up in other positions, some of which are shown in Fig. 2. For the aerial to be vertical at these frequencies, or nearly so, as at "A," a rather high support is required, or a cord between chimney and a support, to bring the aerial away from the house. "B" is much easier, requiring one moderately high support. "C" can be used with a single pole which supports the apex, the wires descending equally to low anchor points. "D" is horizontal, having three supports X at equal heights. "E" is similar to Fig. 1, but requires a smaller span, equal amounts each end dropping down. "F" resembles "A," but part of the top is turned horizontal to require less height.

With some of these systems the feed impedance is lowered, and a 1 : 1 SWR will not be achieved at any point on the band. Despite this they can give good results. Yet another arrangement is one having one quarter-wave section vertical, and the other horizontal and near the ground, resembling a quarter-wave vertical with one similar "radial."

Aerial SWR and Length Checking

With the aerial in use for transmission, this is probably the first aspect to be investigated. Bearing in mind that it is easier to cut pieces off than lengthen the aerial, a 33ft. 6in. dipole was put up at about 25ft. and the SWR checked. It was 1·1 : 1 at 14 MHz, varying to 1·5 : 1 at 14·3 MHz.

It is evident that the best SWR was probably LF of 14 MHz, and as a shift to about 14·2 MHz would be satisfactory, 3in. were cut from each end, to move resonance about 200 kHz HF. After this, the SWR was checked again, and was found to be under 1·2 : 1 through the band.

With this length positioned at 45° ("B" Fig. 2) and the bottom end 5ft. above ground level, the SWR was slightly worse, with its highest at 1·3 : 1 at the HF end of the band. With this length operated at "C," using a single 30ft. high pole, the SWR was under 1·6 : 1 through the band. An SWR around 1·5 : 1 is quite acceptable.

Dipole Results

It is difficult to be too definite about results, as naturally one day may be good as regards conditions and the next not. Using a dipole as at "B," and 300 watts p.e.p., *best* reports have been 5/3 from ZL1 and 5/7 from VK3, reception of these being about 5/5. Aerial "C" proved to be similar, with *best* results 4/5 from VS9 and 5/8 from WA8, and 5/8 for reception. These seem fairly typical of a dipole in the clear. Using reception equipment such as an Eddystone 730/4 or K.W. Atlanta, the dipole seldom moves the meter beyond S4 or S5 for the most distant stations, though when in the clear signals can be copied down to levels barely moving the S-meter. When conditions are good the stronger signals coming through give S7 to S9 readings at a maximum of about 6-8,000 miles. Europeans are often S9+.

In general, it is apparent that it is quite possible to work DX with a dipole, but naturally it cannot compete with a beam or other more elaborate aerial giving higher gain.

Directivity Factor

This is not sharp, but is minimum in line with the wire, and at a maximum at right angles to the wire. A vertical aerial as at "A" is thus assumed to give good low-angle radiation (rather like a ground-plane). With aerial "B" it is in theory possible to angle the aerial to give maximum radiation in a wanted direction. In the present case it cannot be said, from personal experience, that this effect has been to any significant degree.

Reception Side

A dipole is a good general aerial for the intended band (and for *odd* harmonics, where this applies). If the feeder is not too long, reasonable reception is possible over a wide range of frequencies, but on lower frequency bands will become several S-points down on an aerial intended for these bands. So the dipole is really intended for one amateur band, though doing as a substitute with falling efficiency on other bands.

The dipole will be found to give much less trouble from some forms of interference than does an end-connected wire. This can be very noticeable if a change-over switch is available and when signal strength is adequate it is quite practicable to use a 20m. dipole for reception on 80m., or even Top Band, to take advantage of this.

PRE-AMPLIFIER FOR THE LINER-2

TO IMPROVE RECEIVER SENSITIVITY, WITH INPUT GAIN CONTROL

C. J. GILL (G8EEM)

HAVING used the Liner-2 for some time it was decided to fit a pre-amplifier to improve the sensitivity on the "receive" side. Talking to other users of the Liner-2, it was the general opinion that although the sensitivity was improved problems with cross-modulation were introduced. It was therefore decided to construct a pre-amplifier with some form of gain control. This would enable the gain to be reduced when strong signals were causing cross-modulation. If the circuit was such that the gain could be reduced to less than unity the resulting attenuation would be of great value when receiving very local strong signals.

Two further conditions had to be met: These were (1) the circuit had to be simple and (2) the minimum of alteration carried out on the Liner-2. With these conditions in mind the circuit shown in Fig. 1 was constructed and the results obtained are shown in the Table.

TABLE

S-Meter	Without Pre-amp.	With Pre-amp.	
		(*high gain*)	(*low gain*)
S2	3·8μV	5·8μV	1·3μV
S5	7·5μV	11·0μV	2·8μV
S7	25·0μV	37·0μV	8·2μV
S9	120·0μV	200·0μV	44·0μV

These readings resulted by setting the S-meter to a given

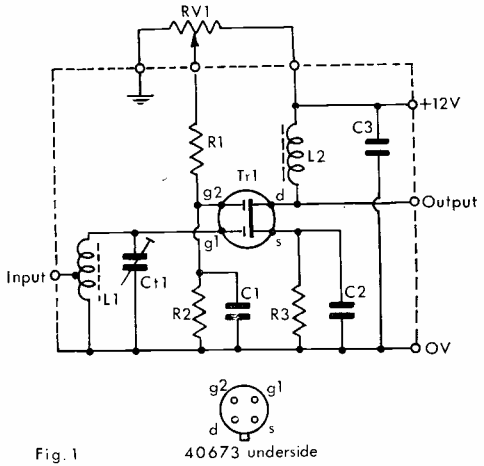


Fig. 1

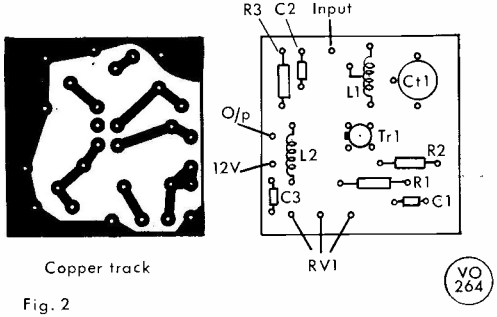


Fig. 2

Fig. 1, Fig. 2. Circuit and construction of the Liner-2 Preamp. Values can be: C1, C2, C3, .001 μF; CT1, 6-25 μμF; R1, R2, 180K; R3, 330 ohms; RV1, gain control, 10K; Tr1, 40673/3N140; L1, 8 turns 30g. on 270K ½th-watt resistor body, tapped at 4th turn; L2, 50 turns on 100K resistor body; P.C.B., 30 x 30 mm. fibre-glass.

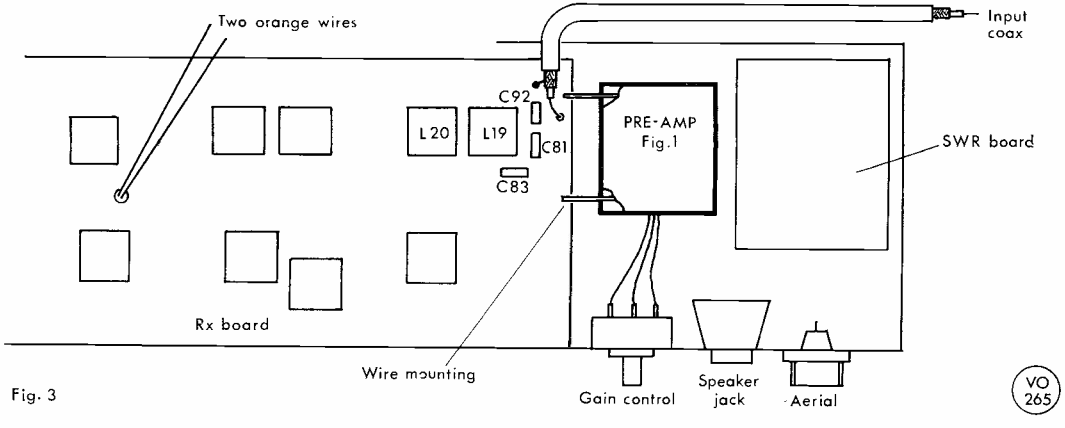


Fig. 3

Fig. 3. The Preamplifier incorporated into the Liner-2. For some further details see text. The gain control enables input level to be reduced in the presence of strong signals.

value and taking the input from an accurately calibrated RF generator.

Construction

The pre-amplifier was constructed on a small single-sided printed circuit board and the layout is given in Fig. 2. The PCB was mounted by soldering two pieces of 14g. wire along each side of the board and then to the earth plane on the Liner-2 printed circuit board. The gain control was mounted next to the external speaker jack socket. This hole was the only physical alteration to the Liner-2. The placing of the gain control is dependent on the size of component to be used. The positioning of the pre-amplifier board and the gain control are shown in Fig. 3. The input pin on the "receive" board is fed with coax, which is removed and reconnected to the input pin on the pre-amplifier board.

The output from the preamplifier is taken to the input pin on the "receive" board. The positive pin on the pre-amplifier is fed from the pin which has two orange wires on it at the far end of the "receive" board —thus the pre-amplifier is switched off on receive.

The only adjustment to be made is to the input tuned circuit. This is best done with the aid of a signal generator, although the prototype was set up without one. With the gain set at maximum and a strong signal being received adjustment was made. Final trimming was carried out by setting the receiver on the beacon frequency GB3VHF.

The transceiver has been used on a variety of antennae ranging from a helical whip to a 13-element Yagi and the results have been good, no problems being encountered. There is no reason why this preamplifier should not be used with any receiver requiring extra gain.

SOME HISTORICAL CORRECTIONS

According to R. N. Vyvyan's book *Marconi and Wireless*, recently republished, the first radiophone contact with Australasia was made by Marconi himself on May 30, 1924, on 92 metres, from the Company's Poldhu station, running 17 kW, reception being "of good strength" in Sydney, Australia. This, of course, pre-dates the 2SZ-4AA amateur CW contact between London and Otago, New Zealand (for which the power was a matter of watts only), the wavelength being about the same.

The point is that Marconi, whose experimental work was of necessity conducted in strict secrecy, was himself becoming aware of the practical possibility of long-distance communication using short waves—and it was on results such as this, and with Canada and the U.S.A., that the U.K. beam system was developed for inter-Continental working by radio. And by October 1924 Marconi was finding that good and reliable contact was possible on wavelengths as low as 32 *metres* using much less power than Poldhu's original 17 kW, with distant places such as Montreal, New York, Rio de Janeiro, Buenos Aires and Sydney.

While the 2SZ-4AA amateur result in October 1924 is no way diminished by these facts (it was, in any case, a "first" with New Zealand) it shows how cautious one must be about some of the early-day claims that have been made.

Incidentally, Cecil Goyder's personal callsign was 2HM or, as it would have been written in those days, EG2HM, that of Mill Hill School Radio Society being EG2SZ. That callsign configuration was adopted before the international prefix system was established, and for amateur operation letters to indicate continent-and-country of origin were used—such as "EG" for *Europe, Great Britain;* "OA" for *Oceania, Australia;* "SA" for *South America, Argentine;* "NC" for *North America, Canada*, and so on.

Sources: *Marconi and Wireless*, R. N. Vyvyan (1933), re-issue by E. P. Publishing, Ltd., Wakefield, Yorkshire. *Radio Amateur Call Books*, 1927-'28.

On another historical note, it is widely believed that Britain held the lead in radar development and went into Hitler's War with the only operational system—which is true so far as the Western Allies were concerned. However, a book published in 1972 on Stalinist Russia asserts that by as early as 1935 Russia had developed a radar system of her own—but in the great "purges" instituted by Stalin (to the detriment of his country so far as war preparedness was concerned) the two individuals responsible for the direction of Russian radar development, P. K. Oschepkov and N. Smirnov of the Anti-Aircraft Defence Agency with many of their assistants, were "liquidated." Thus, Russia entered the War without her own radar and in 1941 had to buy her first equipments from Britain and the U.S.A.

(Source: *Let History Judge*, R. Medvedev, Macmillan & Co., Ltd.)

OBITUARY—C. M. Benham, CBE (G4TZ)

We much regret to have to record that Cedric Benham, G4TZ (*ex*-2ZT, 1927), of Greens Norton, Towcester, Northants., died on December 2, in his 72nd year. He was with the International Marine Radio Co. prior to joining Painton & Co., Ltd., of which he eventually became the principal. Under Cedric Benham's management, the firm developed into one of the best-known manufacturers in the business of quality radio components for the trade, mainly resistors, knobs, dials, switches and connectors of every type, with a modern factory in Northampton. Painton's became a public company and was later taken over by Plessey, which severed the Benham connection. G4TZ himself, having served at sea when with the I.M.R.C., was a keen CW operator with a special interest in RTTY, and was active until recently, with the most modern equipment. He was a member of the Royal Thames Yacht Club and had his own boat *Dolphin II*, out in the Med., with a house in Majorca. His station was at Towcester, where he had only just installed a new aerial system, with a tilt-over tower.

For this month's Reader Small Advertisements, see pp. 631-636

MIXER-VFO FOR VHF

CONSIDERATIONS AFFECTING CHOICE OF FREQUENCY

P. J. PATRICK (G3TWG)

NOWADAYS more and more two and four metre stations are VFO-controlled in one form or another, and this includes not only SSB stations but users of practically every mode. There are several ways of effecting VFO control, all with their advantages and disadvantages in terms of ease of construction and alignment, performance and price.

A straight VFO using FET's followed by multiplier stages can be made to work satisfactorily on VHF, but problems are likely to be met in obtaining a stable drift-free T9 note. It will probably be necessary to run the oscillator continuously even when on "receive" and the VFO must be strongly constructed using only the best components, and there must be adequate buffer stages following the oscillator, otherwise random jumps or fluctuations in frequency can occur. Temperature compensation will probably be needed, and the power supply must be well stabilised and absolutely pure DC without any trace of ripple, or your note will not be T9. Although the circuit is simple, good performance is not easily obtained.

A VXO is simple, stable and effective where full band coverage is not essential. The main disadvantage is the number of crystals that may be needed for full band coverage.

A mixer-VFO will give a stable T9 note and full band coverage without difficulty. It is more complex than a straight VFO, and is therefore a project best undertaken by a constructor with some experience of VHF. The main problem that arises is that of spurious

Table of Values

Fig. 1. Circuit of the VFO

C1, C2	= 22 $\mu\mu$F, s/m	R4, R11	= 150,000 ohms
C3	= ·05 μF	R5, R6	= 27,000 ohms
C4, C8, C11, C14,		R7, R9	= 100 ohms
		R8	= 330 ohms
C16	= 15 $\mu\mu$F, s/m	R10	= 120,000 ohms
C5	= 68 $\mu\mu$F, s/m	R12	= 82 ohms
C6, C22,		R13	= 4,700 ohms, 1w.
C24	= ·01 μF	R14	= 150 ohms
C7, C23	= ·001 μF	R15	= 5,600 ohms
C10, C15	= 2·2 $\mu\mu$F	R16	= 12,000 ohms
C9, C12,		R17	= 820 ohms
C13	= ·0022 μF	R18	= 47,000 ohms
C17	= 0·1 μF	R19	= 270 ohms
C18	= 390 $\mu\mu$F, s/m	RFC1,	
C19	= 56 $\mu\mu$F, s/m	RFC2	= 2·5 mH, min.
C20	= 68 $\mu\mu$F, s/m	Tr1,	
C21	= ·0022 μF, s/m	Tr4	= 3819
VC1	= 75 $\mu\mu$F (*for four metres*) or 110 $\mu\mu$F *for two metres*	Tr2, Tr3	= 3N140 (*see text*)
		Tr5, Tr6	= 2N918
R1	= 100,000 ohms	D1	= OAZ 203, or similar
R2	= 220 ohms		
R3	= 2,200 ohms		

Notes: Crystal can be HC-18U type, 19·75 MHz for Two Metres, 19·20 MHz for Four Metres. Coils L1, L2, L3, L4 all close wound with 34g. enam. on 0·2in. formers in ¾in. cans (*see text*); L1, L3, 17 turns tapped at 4 turns from HT end; L2, 15 turns; and L4 tapped at four turns. L5, 23 turns 28g. close-wound on 0·2in. slugged former. Capacitors marked "s/m" should be silver-mica type. All resistors rated ½w. unless otherwise stated. S1 to be spare pole on transmitter T/R switch.

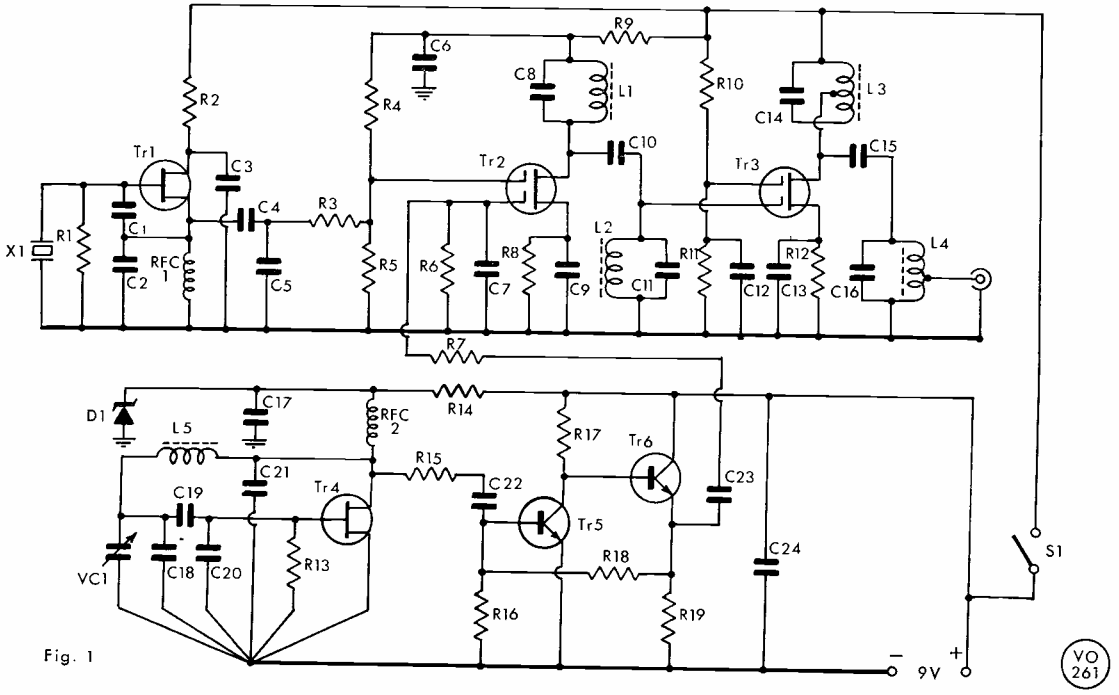


Fig. 1. Circuit of the VFO

emissions, but this can be overcome by care in design and construction.

Finally, there are circuits using a phase-locked loop to tie a high frequency oscillator to one on a lower frequency. These give a stable output without spurious emissions, but are more complex to build and set up.

There are two main varieties of circuit to be found in a mixer-VFO for VHF. The first is similar to a transverter. For two metres a crystal frequency is multiplied up to around 116 or 130 MHz and then mixed with output of a tunable oscillator on 28 or 14 MHz. Such a scheme has the advantage that a later date it can easily be adapted as a transverter for use with an HF SSB rig. The other way is to use a crystal and tunable oscillator the frequencies of which add or subtract to give an output on 24 or 48 MHz. The VFO can thus easily be fed into the first stage of an existing transmitter, in which the necessary multiplication to the output frequency will be carried out. Modifications to your existing rig will be minimal, and it was for this reason that this arrangement was chosen, with an output on 24 MHz for two metres or 23·4 MHz for four metres.

A Clean Output

Both the main varieties of mixer-VFO described in the foregoing are capable of giving a clean output provided that care is taken in their design, construction and alignment—but either type can produce a lot of spurious outputs if proper care is not exercised. There are four main ways in which spurious mixing products can be reduced. First, the crystal and tunable oscillator frequencies should be chosen so that harmonics of the tunable oscillator fall outside the passband of the selective amplifier stages following the mixer. Tunable oscillator harmonics can cause strong in-band spurious signals if this rule is not followed. Careful choice of frequency can also ensure that no low-order unwanted mixing products are radiated, and ratios between VFO and crystal frequencies of 2 to 9 (adding) or 2 to 11 (subtracting) are recommended, amongst others. If the transverter principle is used, additional care will be needed if the crystal frequency is multiplied before the mixer, since spurious products can be generated by unwanted harmonics of the crystal beating with the tunable oscillator. In all cases a crystal frequency which is close to, or an exact multiple of, the VFO frequency should be avoided.

The output of the mixer should be fed into an amplifier using several tuned circuits at the mixer output frequency, well screened from the oscillators. This will kill out-of-band spurious signals before they can do any harm. In this VFO there are four tuned circuits at 24 MHz assisted by one in the first stage of the transmitter. All are high-Q.

The level of the input signals to the mixer should be adjusted so that there is no more input than is needed to drive the following stage in Class-A, with particular attention being paid to keeping the input from the tunable oscillator low. Further increase in the inputs to the mixer will increase the output on spurious frequencies but give little or no increase in output on the desired frequency.

A balanced mixer is needed in most mixer VFO's. Although double balanced mixers are now available in

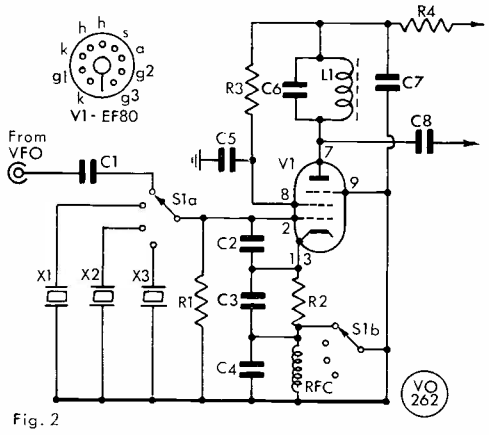


Fig. 2. Transmitter CO modified for VFO input

Table of Values

Fig. 2. Modified Crystal Oscillator

C1	= 30 μμF	RFC1	= 2·5 mH
C2	= 20 μμF	V1	= EF80, or EF184
C3, C5,		L1	= 15 turns 24g. c/wound on 0·2in. former, tuned to 24 MHz
C7	= ·01 μF		
C4	= 100 μμF		
C6	= 10 μμF		
C8	= 47 μμF	S1	= Two-pole multi-way to suit xtal switching
R1	= 100,000 ohms		
R2	= 470 ohms	X1, X2,	
R3	= 22,000 ohms	X3	= Existing xtals
R4	= 4,700 ohms		

IC's like the SL640, the majority of such mixers are balanced with respect to one input only. A typical push-pull balanced mixer will attenuate that input and its harmonics by 20 to 25 dB, while letting through the other input, its harmonics and all the sum and difference frequencies. A balanced mixer is essential where harmonics of the tunable oscillator can fall within the passband of the amplifier stages following the mixer, or, as with transverters, where a harmonic of the prime mover output frequency falls in or close to the two or four metre band. Where the input frequencies to the mixer are carefully chosen and the selective amplifier has a nice tight passband, the use of a balanced mixer is less essential, although some reduction in spurious outputs may still accrue.

Circuitry

This design relies on the first three of these measures to ensure that the output is clean, and has performed satisfactorily now for three years, first on four metres and at present on two. However, it is very important that no variation is made from the designed crystal and tunable oscillator frequencies without very careful calculation. The design uses a 19·75 MHz crystal and a tunable oscillator covering 4·25 to 4·583 MHz for two metres or a crystal for 19·2 MHz and a tunable oscillator covering 4·14 to 4·366 MHz for four metres. Use of a "compromise" crystal frequency of 19·52 MHz will

lead to a harmonic of the tunable oscillator range falling within the desired output frequency range for both bands. If it were attempted to use the VFO for two metres with a 19·2 MHz crystal a similar result would follow, while four-metre operation with a 19·75 MHz crystal would give a spurious harmonic just outside the band. There is one exception to this general rule. It is permissible to retain the same frequency range for the tunable oscillator but have crystal frequencies higher than the VFO output frequency, *i.e.* to use an overtone crystal of 28·58 MHz for two metres, or a crystal for 27·61 MHz for four metres. But do not be tempted to use lower frequency crystals and multiply up, as this is a certain way to breed spurious outputs.

A little arithmetic will show that an attempt to make the tunable oscillator very low in frequency, with the object of further improving the stability of the VFO will invariably lead to harmonics of the tunable oscillator falling in the passband of the selective amplifier, or very close to it, so that a balanced mixer becomes essential. The value of 5½ to 1 used in this circuit as the ratio between the tunable oscillator frequency and the VFO output frequency is a good compromise between the conflicting requirements of stability and a clean output.

So far we have only considered the question of oscillator harmonics. However, it can be shown that where a limited frequency range is covered and the tunable oscillator frequency is chosen so that the output frequency divided by the centre frequency of the tunable oscillator range comes out to an odd half (*i.e.* approximately 5½ for this VFO, as noted) then not only will the tunable oscillator harmonics fall outside the passband of the selective amplifier but also the products resulting from mixing twice the crystal frequency with harmonics of the tunable oscillator. Where higher harmonics of the crystal frequency are involved in the mixing process they will need to mix with the eighth or higher harmonics of the tunable oscillator to give outputs within the bandwidth of the selective amplifier. Provided the oscillators give a reasonably pure waveform and the inputs to the mixer are kept low, these high-order mixing products should not cause problems.

Other Circuit Considerations

The tunable oscillator uses the FET Vackar circuit which is stable and gives a good output waveform. The crystal oscillator is an FET Colpitts circuit. A bipolar transistor could be used here but FET's are now nearly as cheap. For best results the tunable oscillator should run continuously on both "transmit" and "receive," as shown in the circuit diagram, but stability is still very satisfactory even if this is not so arranged. The networks C4, C5, R3 and C23, R7, C7 are used to adjust the inputs from the oscillators to the correct level for the dual gate Mosfet mixer Tr2. R3 and R7 were mounted as part of the leads between printed circuit boards to facilitate easy substitution when adjusting the inputs to the mixer. The mixer uses a conventional dual-gate Mosfet circuit which has a good reputation for efficient, clean mixing. 3N140's were used in the mixer and selective amplifier but there is no reason why gate-protected Mosfet's should not be used. The selective amplifier has four tuned circuits at 24 MHz. These are enclosed in individual ¾in. square cans with the

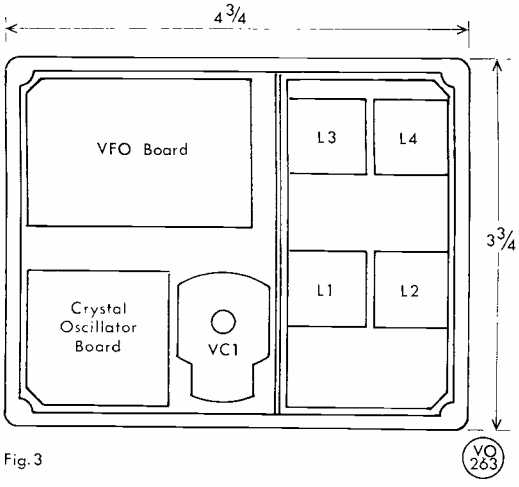


Fig. 3. Layout of the prototype Mixer-VFO

tuning and coupling capacitors mounted inside the cans. Using this type of can with printed circuit board, arrangements must be made to earth the can to the board. The writer arranged this by using a solder tag on top of the board wired through. Other constructors might consider using double sided printed circuit board for the mixer amplifier board the smaller ½in. square *Neosid* A6 cans with their 5 mm. formers. (These latter are designed for fitting on printed circuit board, and if used the coils should be wound with 22 turns tapped at 5 turns instead of as shown with the circuit diagram). The amplifier stage must be screened from the mixer and the oscillators to avoid oscillator harmonics by-passing the tuned circuits. The use of two ¾in. square cans side by side will provide screening between the mixer and amplifier stages but a screen will be needed between the oscillators and the amplifier.

It will be necessary to modify the oscillator circuit of the transmitter with which the VFO is to work so that it acts as an amplifier when switched to the VFO input. The circuit in Fig. 2 shows a simple and effective way of doing this. When switched to a crystal position, V1 acts as an 8 MHz oscillator tripling in its anode to 24 MHz, while when switched to VFO the feed-back to the cathode is short-circuited by S1B and the valve functions as a straight-through amplifier at 24 MHz.

In the prototype, the unit provided the right amount of drive for the transmitter, largely by chance! A greater voltage output could be obtained into a high impedance by tapping the output higher up L4, while a lower voltage output could best be obtained by increasing R7 and possibly R3.

Construction

The three main sections of the VFO were built on separate printed circuit boards, sized 1⅝ x 3½in. for the mixer board, 1½ x 2⅜in. for the tunable oscillator, and 1½in. square for the CO board. This was to allow for changes if found necessary without the need to start completely afresh. The prototype was built in a diecast

box 4½ x 3½ x 2 inches and it is undoubtedly a tight squeeze even with the *Jackson Bros.* C804 capacitor. It would be better, if space permits to build the VFO into a rather larger box and use a double bearing capacitor. This would allow L5 to be positioned further from the sides of the box, which is desirable where components are mounted on the lid, as in the prototype. Alternatively L5 could be placed in a screening can.

For four metres VC1 needs to be 75 $\mu\mu$F but for two metres a capacitor of approximately 110 $\mu\mu$F is needed. This value can be obtained by removing five fixed and five moving vanes from a 150 $\mu\mu$F Jackson C804 capacitor. Alternatively some scaling up or down of coil and capacitor values (up to plus or minus 30%) could be tolerated so as to use an existing capacitor, taking care to increase or reduce all of the fixed capacitors in the same proportion.

Alignment and Adjustment

Alignment should not be difficult assuming that the circuit values given are followed. Check that both oscillators are functioning and set the core of L5 to give the correct frequency range on the tunable oscillator. The feedback into the VFO is sufficient to maintain oscillation but not much more, and it is just possible that an increase in the value of C19 might be needed if a below-average transistor and a low-Q core for the coil were used simultaneously. Having set the core, check that oscillation occurs throughout the tuning range. Next, the selective amplifier can be aligned by feeding its output into a meter, or into the transmitter with which it is to work and measuring the grid current at the first test point with the transmitter switched to "Net" or the PA valve removed. When output is obtained a check should be made with a receiver or absorption wavemeter to ensure that the tuned circuits are aligned to the correct frequency and not to an oscillator harmonic. Slight stagger-tuning is desirable, and the writer aligned L1 and L2 for output on 24·08 MHz and L3 and L4 for output on 24·25 MHz.

If you should use different coil formers with the selective amplifier it is advisable to check the coils with a GDO both before mounting and after they have been mounted and coupled together on the chassis.

If the inputs to the mixer are already at about the right levels you will find that all the coils in the selective amplifier appear to tune fairly sharply and the output is sufficient to drive the transmitter with some falling off near the band edges. With too much input to the mixer, it and the following amplifier stage may be overloaded and the tuning of L1 and L2 in particular may seem broad. R7 should then be increased to reduce the input from the tunable oscillator to the mixer until tuning becomes sharper, and it may also be possible when an optimum value has been found for R7 to increase R3 as well. If insufficient output is obtained from the unit it may be possible to increase it by decreasing R3 or R7 (in that order) but care should be exercised if this is done since it could produce a disproportionately large increase in spurious outputs. No attempt should be made to decrease R3 or R7 beyond the point where any apparent broadening of the response of the selective amplifier is noticed. Further additional output can then only be obtained by altering the tapping point on L4, if feeding into a high impedance, or by providing additional amplification. However, with most transmitters output from the VFO should be fully adequate.

Conclusion

This VFO has now been in use on 4 or 2 metres for some three years. Stability is good and no comments of any spurious outputs have been received. It is a fairly difficult project, and a newcomer to VHF would be best advised to get going with crystal control and then build the VFO rather than try and build the whole lot as one.

Numerous contacts have been made with SSB stations using this VFO and no adverse comment has been received on stability. One station remarked after about 5 minutes that "You have an appreciable amount of carrier" having previously thought that he was talking to an SSB station.

If intended for use on FM channels it would be desirable to fit a dial with good resetting accuracy and possibly to restrict the coverage of the VFO as well so as to ensure that the VFO can be accurately re-set to the required channel.

VINTAGE WIRELESS MUSEUM—Change of QTH

Douglas Byrne, G3KPO, writes to say that he has moved his Vintage Wireless Museum—founded by him and of which he is the curator—to Alverstone Manor Hotel, Shanklin (*2586*), Isle of Wight. Anyone wishing to visit during the Summer is invited to get in touch with him there.

ABOUT RSGB FINANCES

We were glad to see, from their recent accounts, that the Radio Society of Great Britain has been able to show a working profit for their year to June 1974 of £3,700. Though this is not much on a gross "take" for the year of nearly £88,000 (a reasonable commercial figure would be £10,000) it does at least go towards diminishing the losses of previous years, and still leaves the Society with substantial assets.

It is also interesting to know that—as first put forward in our *Magazine* Editorial for February, 1972—the RSGB is now considering the possibility of getting the Hq. out of London altogether. All who are in any way interested in the Society and have that Editorial available should re-read it in the light of the current situation, forecast more than two years before the action is beginning to be taken. In this same context, the Editorial in the August 1970 issue of *SHORT WAVE MAGAZINE* might be worth re-reading in view of present circumstances.

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By ***Justin Cooper***

MAINTENANCE AND FAULT FINDING — MODIFICATION PROCEDURES — OTHER TECHNICAL POINTS — ABOUT BC BREAKTHROUGH — READER NOTES AND COMMENTS —THE LADDERS TO DATE

QUITE often a letter comes in, which implies that the writer thereof, though a keen SWL, is very doubtful indeed about tackling any constructional work or even maintenance of his own equipment—so perhaps it would be worthwhile to indicate J.C.'s own approach to the problem.

Take maintenance first: One must have preferably, the full handbook, and if not, at least a cricuit diagram. The handbook will include a "table of voltages" which should immediately be marked-up with the actual figures obtained with the station testmeter; if there is only a circuit diagram, this can be marked with the voltages at each valve-pin or transistor electrode, the "conditions of test"—the position of all receiver controls—being noted on the back. This is filed away with all the other station data in a large envelope which lives in the shack with the licence, the *Call Book*, the log and other such documents pertaining to the station.

Now, if you have a fault, you can safely assume that nothing has happened to the tuning so you can now proceed to business, *with a scratch-pad and pencil at hand.* First, note the signs: Does the Rx light up when you switch on; if it doesn't, have a care to check the fuses, both in the set and in the power-plug, before you go further. If you see smoke, it is not a disaster, because that will enable you to identify the culprit optically (by looking at it!) to tell the area where the fault lies. If none of these is the answer, slip the thing out of its case, clip the meter negative to the chassis, and proceed to go round all valve pins in turn, checking the figures so obtained against the figures you had first, marked up on the circuit, and note any deviations of more than, say, five per cent, against the relevant valve and pin number, or transistor and electrode. This will pin-point you down to a section of the circuit—let us say the grid of the output stage is positive instead of negative, and the anode of the first AF stage is lower than usual. Clearly the circuit fault lies between these two points, which are jointed by a coupling capacitor in the circuit. Reach for the iron, unsolder one end of the capacitor, and recheck the pin voltages, which have now probably returned to nearer the normal; if so, replace the capacitor, toss the old one out—this is important for the future—and all's well. If the voltages are still a bit awry, check all the resistors in the first AF stage and the output stage, as one or more of them may have changed value as a result of the initial fault.

Simple, isn't it? However, the main thing is to keep it logical, and clearly to note down exactly what you do at each test, what range the meter was on, and so on, so that you can be certain that you can repeat any of your tests, and so that you can avoid having to go over the same ground time and time again if you do get a baffling fault. By looking back at the notes you made, and *thinking*, you should be able to see where you made the false step. Without these notes you can go round and round in circles, and convince yourself you can't fault-find! Reason—you will have forgotten the exact sequence of tests and measurements, so you won't be able to spot the false step.

Now, another question of a similar sort is the modification of an existing bit of gear. First of all, *make sure it works in its original state.* This means that if it doesn't work after modification, the fault must lie in the modification work, which simplifies things enormously. Secondly, write down each step as you do it, so you can reverse steps if need be and return to the original unmodified-and-working condition, should things go wrong. Thirdly, before you reach for the tools, sit down with the pad and pencil, and write down all the steps which need to be taken. For example, J.C. has an old TW Communicator Top Band transceiver, from the days when nearly all cars had positive-earth electrics. The car now in use has negative-earth, so the Communicator must be made to suit the new conditions. How do we go about it?

First, list the ways in which it *might* be achieved, and consider these, in case a new line of attack might be opened out therefrom. Scrub out each of these lines as you decide they are "not on" until you find the best way. Now, sit down again with a fresh sheet, and detail what has to be done: in this case, isolate the IF and AF modules so that they can be run on negative-earth supplies without a short, reverse the zener diode, isolate the inverter chassis from the main chassis, and replace the *p.n.p.* transistors at RF, mixer/oscillator and BFO stages by silicon *n.p.n.* types. Then trace the existing wiring of the twelve-volt line, sketching it out until you are sure you have it all accounted-for. Now, consider how each step can be achieved with the material you have at hand, and write it down in detail. When you come to the wiring of the twelve-volt line, turn back to your first sketch and see what can be done with the existing wiring, marking in the new wiring in a differint colour of pencil on a new sketch, to compare with the original one you did. Check it all through.

You have now probably done a complete evening's work on your project without touching anything in anger. The following evening, recheck to make sure you still understand what you are doing, and set out to achieve each objective individually, marking them off as you do so. When all is done, and point-to-point checks show everything is as you meant it to be, you can be fairly confident that switching-on will see the rig basically running OK, and only a bit of tidying-up will remain to be done—like a minor adjustment of resistor values in the revamped RF, mixer and BFO stages for optimum working, and maybe a little tweaking up of the front-end alignment.

You notice how much of the work is done beforehand, on paper. All the records are filed away in a "Lab Book" which is kept up-to-date, with the dates of its opening and completion marked on the spine.

New Entries

Our first in this category is from *R. Elliott* (*Brentwood*) who makes an initial entry contrived with a 9R59DS receiver, Joystick and Joymatch ATU. Ray mentions the problem of images encountered with this set-up, and is now debating on the alternatives of a pre-selector on the one hand or a different receiver altogether. The answer to this one is that one should avoid a preselector, but if used, then it must be run at the lowest convenient gain level in the presence of high-level signals nearby—and it may well be found that the preselector needs to be used in conjunction with an aerial attenuator to get the best results. On a different tack, Ray has already passed the R.A.E. and is now busy on the Morse so as to be able to go straight to a G4 call.

J. Dougherty (*Ryhope, Sunderland*) has been in and out of SWL since back in 1950, when an R.1155 was purchased and used right through till 1970. Some of the intervening years were spent as a wireless operator in the Army in Malaya, which kept the interest going. Recently, a Trio QR-666 receiver was purchased—to the horror of the XYL—(we know the problem!) John holds his dipoles up by means of bamboo poles obtained from the local carpet-shop, who are pleased to get rid of them.

L. Gibson (*Barrow-in-Furness*) has a Trio JR-310, a dipole for Twenty, and an end-fed wire for general use, coupled through an ATU, plus, on the earthing side, a ten-foot spike in the ground and 70ft. of old coax cable in the ground as a sort of "earthed counterpoise." Les is a member of the Furness Club, and reckons the help and advice he gets there to be invaluable.

Technical

The first question comes from *W. J. Reid* (*Hailsham*) who starts by wondering about ATU's versus preselectors—in his case not so much from the point of view of cutting the images but rather that of simply getting the best from a Lafayette HA-800. Unhesitatingly, we would plump for an ATU, the more so in this case as it would be tacked to a long-wire arrangement, which is wide open to pick-up of unwanted signals on the one hand and liable to reflect odd values of reactance into the receiver on the other. Use of an ATU with 100 feet of wire would almost certainly bring up signals on all the main bands of interest by a couple of S-points or so. *Six metres* is an American band which is interesting insofar as there are known cases of signals on it covering inter-continental distances at the top of the sunspot cycle. The last question is the matter of getting hold of a 100 kHz crystal to plug into the calibrator in the HA-800—the only thing to do here is to trace the circuit out, measure the dimension of the

crystal holder (or specify the valve-base it is meant to be plugged into) and to give these dimensions to one of the crystal merchants who advertise in the *Magazine*. Alternatively, it may be possible to get one cheaply at the local Club junk-sale, and modify the calibrator to provide whatever base the crystal wants to sit in: the older "rocks" will sometimes be found to be the right size to use two pins of an octal valve base, which might be a help in basing such a crystal.

An interesting question is posed by *R. Holland* (*Malvern*) who finds his aerial-wire is starting to stretch and fray—what is the best wire for a 7 MHz dipole, then? A Good Question indeed! Personally, J.C. has ever been one to prop up the centre of his dipoles with a pole, and let the ends be held up by much lighter and usually impromptu sky-hooks. The whole point here is that if you consider the weight of the aerial wire and its insulators plus the heavy coaxial feeder involved in a forty-metre dipole, you realise that the dead-weight acting downwards is translated into considerable strain on the ends—thus the heavy wire and strong halyards called for in most of the books. Now, if you prop up the middle on a pole, all this strain is removed and transferred to a pole which is simply in compression. Hence, the wire and the ends can be much lighter all round—and if the ends are allowed to droop down a bit into the inverted-Vee configuration you find you have more pickup off the ends of the wire—that is, a more all-round polar pattern of response. J.C. has his "pole" lashed to the side of the house, and his aerials hanging from this have included a very successful inverted-Vee for 7 MHz made from fine copper wire and using some of the plastic curtain-ring insulators so long advocated by G3KFE. As to stranded or single-conductor wire, J.C. has a personal preference for the single conductor and *no* soldered connections, but others have had much joy out of stranded stuff; the vital thing in either case is to do preventive maintenance at regular intervals, to catch any problems before they become serious.

R. Andrews (*Barry*) listens a lot to the GB3BC repeater, through a solid-state converter into a 9R-59D, and thinks this is a good thing for VHF communications—probably rather more so in the Welsh hilly districts than, say, in the East Anglia where the terrain is flat enough to give a mobile a reasonable range without repeaters.

The problems of BC stations appearing in the 14 MHz band, observed on a FR-50B receiver, was raised last time by P. Rooney, and is commented upon by *G. F. Gullis* (*Ogbourne St. George*). He and his brother Sandy have only ever heard one in their FR-50B which has been in use for a year now pretty intensively. This backs up J.C.'s feeling that most likely the signals referred to have little to do with the receiver itself; they may be due to the use of an untuned long-wire displaying a resonance at an unwanted frequency and so collecting excessive RF from a strong BC station on, say, the image—or a soldered joint in the aerial wire (or even a dirty and unsoldered joint for that matter) could be acting as a rectifier and so causing harmonics of the BC station to be strong locally. One could, indeed, even find the effect as being due to such a "rectifier" joint in the house wiring, a wire fence, or a rusty guttering—this last often a source of TVI for the transmitting chaps. The only way to find these little horrors is to have a portable radio tuned to the signal, a loop on the end of a piece of co-axial cable plugged into its aerial socket, and to use this as a "sniffer" to try and detect the points where the unwanted signal is strongest. And, please, blame Murphy, *not* J.C. if the offender turns out to be buried in the plaster!

R. Carter (*Blackburn*) finally gave up chasing the elusive fault in his receiver, and sent it off to Bill Lowe at Matlock, whence it came back in a week, in nice time for the contest. On a technical point, Ben postulates a receiver covering, say, 28-30 MHz for AM, CW, SSB and FM modes, and wonders whether the addition of a converter to cover Two Metres would still enable all these modes to be heard—they are all popular on Two. Yes, by all means—the only possible snag would be that you might have a sideband reversal, depending on your local oscillator frequency, which would mean using the "wrong sideband" position of the switch for this mode—no snag there. Possibly one might have difficulty with FM but no more than would have been noticed if FM was listened to on Ten. A "proper" FM detector is needed in the main receiver, as with slope detection it is often necessary to adjust the *IF* selectivity to suit the FM signal on tune. They can all be running different amounts of deviation. Your old scribe uses an *Eddystone* 888 receiver and 28-30 MHz output converter on Two and has found no need for modifications to the 888 for any mode.

Last time around we noticed here the absence of the familiar scraw from *K. Kyezor* (*Perivale*), explained now by the problems associated with getting fixed up to move to Wellingborough (still not completely resolved) where, he says wistfully, there will be room to put up a *real* aerial. Something to look forward to, and an incentive to keep the negotiations going; meantime, the old JR-310 soldiers merrily on at Perivale. Certainly, says J.C., it should be allowed to continue doing so until it can be evaluated on that good new aerial before any decision is made to replace it by something better.

R. MacKean (*Liverpool*) has an HE-40 and is annoyed by the S9+ locals on SSB who are only resolvable for about three sentences per QSO. Overload is the problem here; the incoming signal is so large by the time it gets to the detector that the BFO voltage is quite inadequate to enable it to be resolved. The answer is to reduce the signal, either by fitting an IF gain control, or by the use of an attenuator in the aerial lead, and also, *if* it can be done without impairing BFO stability, raise the level of BFO injection by increase of the coupling capacitor.

J. Trevett (*Broadstone, Dorset*) asks how to make a start with RTTY? First, one needs a receiver capable of holding a good SSB signal well—in other words, a stable Rx. Secondly, one needs to build or buy a "terminal unit" the function of which is to turn the "received noises" into signals that can drive the teleprinter, this last being the third basic item. For this old scribe's money, the first real step would be to join up with BARTG because they seem to be able to advertise all the things an RTTY op. could want, often at well below the open-market prices, and because their *Newsletter* contains a wealth of useful information on the subject. And, of course there are books on RTTY.

Funny Prefixes

As always, there is a nice balance between the funny-curious and the funny-ha-ha varieties. Starting with the latter, *R. C. Woolley* (*Ashbourne*) came across 5HMOG/AM in an East African Airways VC10 over the Channel. These are too common to be funny, really; one suspects that they *are* genuine enough, but with such odd calls, one could hardly classify a VC10 airplane as a *pukka* amateur shack!

The alternate use of I9 and IT9 from Sicily is queried by *M. Quintin* (*Wotton-under-Edge*), he having heard the same station giving same name and QTH and using both these prefixes at different time. Frankly, J.C. doesn't know, but since the Italian licensing is based upon postal regions it may well be acceptable. We have a near-parallel in the U.K., where an amateur in Monmouth has to make his own decision to be G or GW—but once made, it sticks.

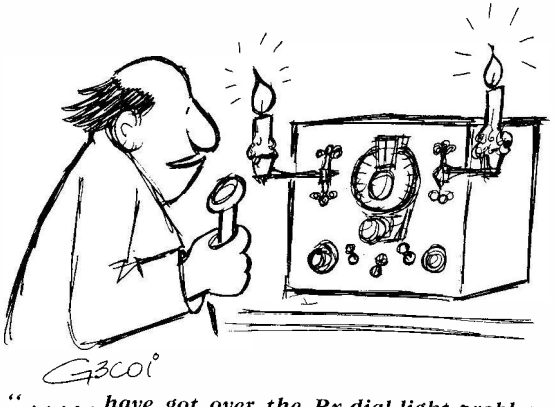
Strange prefixes seem to be very much associated with the CQ WW Contest says *A. Roberts* (*Loughborough*). Andrew turned up the 9JØBO, HG5, CV4, 4M6 and the CT7 chaps during the contest, and, rightly, counted them all in to help his total along. His list of 120 new prefixes, incidentally, were all booked in with the aid of 54 inches of vertical wire, no aerial tuner, a Trio 9R-59DS, and a good location. Not mentioned is the need for a pair of "good" ears.

Now to *S. Foster* (*Lincoln*), who adds 34 new ones to his total. Among various prefix points from earlier rounds, Stew can vouch for the IFØXRR/5, primarily operating for propagation research, and using low power.

Several JG calls puzzled *M. Smith* (*Matamata, New Zealand*) as also did FT9KL heard working a VK. The JG calls are variants on the JA theme, but as for the FT9—in the absence of any mention by anyone else, or any "gen" here, for the moment we must, regretfully enough, denounce him as a probable phoney.

General Chat

The pages are slipping inexorably through the typewriter, but still many letters remain to be mentioned, so we must be brief.



" . . . . . have got over the Rx dial light problem here . . . . . "

Interesting group of overseas visitors at the Leicester ARRA Exhibition on Friday, November 1st—left to right, E12VFP, EI4AN, EI6S, E12CR and EIØCF; all of whom made the journey specially for the Show.

D. Sharred (*Birmingham*) has added six more countries to his previous 21 on Top Band, bringing him up to 27. Apart from 4X4UR, 4U1ITU and 9H1BX on SSB, CW was the mode with which to log ST2AY, HBØLL, and, on November 15, VK6HD brightened David's listening. What it boils down to, though David doesn't say so directly, is that he has heard all continents on Top Band, which is no mean achievement.

P. Barker (*Sunderland*) seems to have spent quite a bit of time on the receiver, but, as he says, there has not been a lot of DX about—perhaps the best of the crop was to copy KØYKJ from Boulder, Colorado on SS/TV, and to hear XU1DX in Phnom Penh.

H. M. Graham (*Harefield*) usually has the odd word of wisdom embedded in his letter. Noting our comments last time out on changing listening-times and the effects on the score of so doing, Maurice (who is normally a mid-evening and weekend afternoon listener) decided to have a basinful of 0630-0730 and see just what profit he could gain from the single hour. On Twenty there were A9XT, SM6DBB, SQ8GVM and 9H4K, while a quick check on Eighty turned up one DL, a brace of G's and WA9TZD. Not much in the way of S-meter movement on either A9XT or WA9TZD but both *perfectly* readable. The proof of the pudding is, after all, in the eating. On another tack, Maurice listens on Ten when he can, and this is the interesting bit, he found pay-dirt on each session, but, of course, mainly in a North-South direction. Again, proof that, around the period 1100 to maybe 1600ish, the band is well worth checking for DX signals.

K. Salter (*Newton Abbot*) seems to have hooked nearly all the genuine oddball callsigns that have been about, with nary a phoney in the lot; and his normal listening times on Twenty have been productive of a fair share of DX.

J. Cowan (*Rochford*) is back ashore again and, at the time of his letter waiting to go to another ship, this time as the only operator aboard, which should make sure the Captain keeps an eye on him! Incidentally, the leave ration for "sparkers" these days is one day off for every two spent at work; and if you find that too much you can always convert a month of your leave into seatime and be paid for doing so!

There is, he observes, a subtle change in his thinking of late—thus *N. N. Graham* (*Newcastle-on-Tyne*), who is beginning to feel some slight urge to *communicate* with fellow radio amateurs. It looks as though the ranks of the transmitting types will increase by at least one sometime in 1975, XYL QRM permitting.

Now *S. Lawrence* (*Market Harborough*) who, it may be recalled, we conjectured to be the author of the unsigned letter last time; Stephen is a bit "umpty" because we did not credit him with the score claimed in the unsigned letter—but how could we, till we were *sure* who wrote it? In fact, J.C. sat on it and now the mystery is resolved, it will go in the Ladder. On a different tack, Stephen mentions a "941GN," which, in his handwriting could well be 9G1GN; he also wants to know about the YU suffix /X, which we understand to be rather on the lines of our own /A or /P system. Finally, he has a call for help—his school radio society has a CR-66 receiver, and they want some gen on it, data sheet or whatever, to copy and return within the week. If you can lay hands on such, send it to: S. Lawrence, 7 Ashfield Road, Market Harborough, Leics.

R. C. Bradley (*Wrexham*) finds the 80m. band, in the morning, full of jungle-bells and high-power CW signals; much of this, it must be said, is probably the legitimate output of the commercials with whom we share the band, plus of course, amateur CW signals and RTTY from legimitate amateur stations. This, to J.C., is a mere nothing since after all these commercial signals have prior right; what is so horried on Eighty is the amount of sheer drivel talked by phone stations other than DX operators—a marked contrast to the chat, say, on Two or Top Band. Frankly, this old scribe ventures on to 80m. unless he has his trusty audio filter and Q-Multiplier wound up to the limit so he can read the DX CW right through the sidebands and splatter of the Phone merchants nattering in the CW end of the band.

Bert Glass (*Plymouth*) further raises his CW score, and has also been listening profitably on Ten during the middle of the day, only Oceania being unrepresented in his list.

A first and last letter comes in from *D. M. Macleod* (*Loanhead, Midlothian*) as he is now GM4DGS. However, he is at the moment stuck as the gear suffered in the journey back from his old station at VQ9DM in the Seychelles.

The *Binghams* (*Carrickfergus*) will soon, hopefully, have a fully-licensed amateur in the family, as Billy is attending Morse and R.A.E. at Jordanstown Polytechnic; this probably is the reason for only seven new prefixes hooked this time.

We did begin to think that *N. Henbrey* (*Northiam*) had sunk

ANNUAL HPX LADDER

(*Starting date January 1, 1974*)

SWL	PREFIXES
R. C. Woolley (Ashbourne)	499
J. Dougherty (Sunderland)	457
K. Salter (Newton Abbot)	457
N. N. Graham (Newcastle-on-Tyne)	444
A. C. Roberts (Shepshed)	427
S. Lawrence Market Harborough)	423
S. Sharred (Birmingham)	413
J. D. Porter (Baslow)	406
J. Hesman (Birmingham)	390
A. J. Gullis (Ogbourne St. George)	385
M. L. Peters (Newbury)	369
S. McHugh (Pontefract)	345
D. J. Porter (Doncaster)	336
C. Davis (Norwich)	311
W. McFaul (Londonderry)	289
S. H. Bandy (Luton)	288
G. George (Woodmancote)	270
B. Russell (Runcorn)	264
R. J. Rennard (Redditch)	254
L. Gibson (Barrow-in-Furness)	226
R. Elliott (Brentwood)	212
J. Aspinall (Leeds)	202

Starting score 200, in accordance with HPX Rules. All Prefixes in this list to have been heard in 1974. When a score of 500 is reached, transfer to the All-Time Table will follow. Final listings of the 1974 Table will appear in March "SWL." New Table starts from January 1, 1975.

HPX LADDER

(*All-Time Post War*)

SWL	PREFIXES
PHONE ONLY	
W. Bingham (Carrickfergus)	1560
R. Shilvock (Lye)	1456
S. Foster (Lincoln)	1411
T. Rootsey (Ilford)	1405
K. Kyezor (Perivale)	1329
J. Fitzgerald (Gt. Missenden)	1222
R. Carter (Blackburn)	1181
A. W. Nielson (Glasgow)	1142
M. J. Quintin (Wotton-u-Edge)	1104
L. A. S. Poole (London, N.21)	1090
H. Alford (Burnham-on-Sea)	1049
P. C. Jane (East Looe)	1048
B. Hughes (Worcester)	1041
J. H. Sparkes (Trowbridge)	992
G. W. Raven (London, S.E.11)	975
A. West (Herne Hill)	961
R. H. McVey (Weston-super-Mare)	922
M. Cuckoo (Herne Bay)	918
N. Henbrey (Northiam)	901
K. A. Whiteley (Castleford)	884
A. R. Holland (Malvern)	857
N. Askew (Coventry)	855
H. M. Graham (Harefield)	829
Mrs. J. Jane (East Looe)	826
H. A. Londesborough (Swanland)	824
E. W. Robinson (Bury St. Edmunds)	817
B. Thomas (Pontefract)	787
J. Gravell (Burry Port)	775
E. Parker (Hove)	771

SWL	PREFIXES
PHONE ONLY	
C. K. Verstage (Old Basing)	759
P. Barker (Sunderland)	739
S. Eldridge (Crawley)	731
B. Cushing (Hove)	681
L. Craven (Alvechurch)	679
A. Buchman (New York)	678
D. Sharred (Birmingham)	661
C. L. Lee (Ilford)	657
G. F. Gullis (Ogbourne St. George)	643
M. Pein (Liverpool)	627
M. F. Parry (Shrewsbury)	612
G. Lucas (Kennoway, Fife)	609
M. Rodgers (Harwood)	600
J. R. Cowan (Rochford)	592
M. Eccles (Lancaster)	572
B. J. McCartney (Workingham)	559
M. Smith (Matamata, New Zealand)	554
M. Kitchener (Hitchin)	549
R. Swan (London S.E.19)	547
W. H. Smyth (Hartlepool)	531
P. Rooney (Liverpool)	526
J. Bell (Hampstead)	521
CW ONLY	
A. Glass (Plymouth)	1064
T. Rootsey (Ilford)	723
W. B. Taunton (Meopham)	675
H. A. Londesborough (Swanland)	662
G. Richards (Aberdeen)	410
A. F. Roberts (Kidderminster)	362
S. Sharred (Birmingham)	341
A. W. McNeill (Newbury)	319
W. Hutchinson (Hornchurch)	282

Starting score 500 for Phone, 200 for CW. Listings include only recent claims.

without trace in the autumnal monsoon weather; but no, he is still with us and active enough to rewrite a list containing 901 prefixes, from scratch.

Oddly enough the next letter in the clip comes from another OT in the HPX game, namely *J. Fitzgerald* (*Gt. Missenden*), who, we thought, had also sunk. In fact, the ailment was nothing so serious—just a fit of absent-mindedness which caused him to miss a couple of deadlines!

A. Buchman (*New York*) was also unfortunate enough to miss a deadline, but again, no matter, the prefixes still roll in; and now at last Alvin has his Joystick to help things along a little.

It's an ill wind that blows no good at all, must be the conclusion *M. Pein* (*Liverpool*) arrived at—he lost a large chunk of his Prefix sheet and so had the task of writing them all out again by dredging through the logs; the good was that this revealed seven prefixes which had not been claimed before!

How to pass the R.A.E. when one works a shift system which makes one lose one lecture in three is the problem for *J. W. Sanderson* (*Ferryhill, Co. Durham*); and it is compounded by the fact of not knowing any other amateur. One of the ways to deal with the first problem, provided one has an understanding R.A.E. lecturer, is to leave a recorder running during the lecture, and to play back the tape—a cheap Jap cassette job is quite adequate for this sort of thing. As for the problem of no contact with the locals, SWL Sanderson's phone number is *Ferryhill* 51938—will any local amateur or SWL please get in touch?

P. K. Freeman (*Poole*) seems to have become a bit entangled with his aerial tuners, for VHF and HF. A good rule of thumb is to tune the capacitor to 1½ pF per metre of the wavelength you are after, and then to adjust the coil to suit. Another thing is that the *pi*-network won't necessarily cope with *anything*—there can be certain reactive combinations which baffle it. However, all is not lost—the quickest way out of the problem is to "birds-nest" the components together with croc-clips and wire into various configurations until you get something that *does* do the trick; and, when you've got a circuit that works, draw it on paper, strip the lashup down and build it properly. This will be found far quicker than trying to design things up, mainly because you are for all practical purposes unable to estimate the value or sign of the reactance, let alone the resistance, for every band of interest.

R. H. McVey (*Weston-super-Mare*) reckons conditions have been better than would have been expected of late; he was a little surprised to find VU7GV and doubts the authenticity of the call—we wouldn't think so, as it was probably VU2GV operating, as he said, from Andaman Is.

J. Bell (*Hampstead*) finds he gets a headache after about an hour at the receiver chasing prefixes—this may be nothing more than headphones fitting badly, or the lack of ventilation in the shack.

The loss, and subsequent remaking, of a Prefix entry list is bemoaned by *B. F. Hughes* (*Worcester*) as he is pretty sure some 30 or 40 have been allowed to slip through the net—never mind, you'll soon pick them up again! On another tack, B.F.H. wonders if photostat copies of some of his rare QSL's would be worth sending in for possible reproduction. It's worth a try, although one would think the contrast would be too low to reproduce well from a photostat.

C. Verstage (*Old Basing*) has quite a stable of receivers, including a Drake R4C, Racal RA17, Yaesu FR-400, and now has added a Yaesu FR-101 which he finds better. It is interesting to note that one of the recent QSL cards to arrive was from 9Q5CO which seems to imply a resumption of activity in that country. Another rare QSL to come in was from XV5AC.

And that, good people, is the end of it for this time. We have several other pieces of paper, all of which come from those who send in a score without a letter, said scores having been taken in. See you all next time out.

Finale

Having mentioned "next time" we must define it. First post arrival, **January 24, 1975**, addressed to "SWL," *SHORT WAVE MAGAZINE, BUCKINGHAM, MK18-1RQ*. And, for the Coming Year, may all your signals be good ones.

VHF BANDS

A. H. DORMER—G3DAH

Oscar VII

AS briefly reported last month, *Oscar VII* was successfully launched on November 15 at 1711z and by the second orbit all planned systems were "Go" and signals and telemetry were being copied. As must be expected, it takes a bit of time to establish precise orbital parameters, but the latest observations indicate an orbital period of 114·944 minutes, a Westerly increment of 28·735° and an inclination of 101·7336°—a retrograde orbit therefore, as was the case with *Oscar VI*. It should be noted that the figures following the point are *decimals* and not seconds of time or arc. What this means then is that successive orbits will be spaced by about 1 hr. 55 mins. in time and by about 28·74° West at the equator crossing points. For example, during Orbit No. 300, *Oscar VII* crosses the equator at 1503·8z and at 275·9°W and during Orbit No. 301 the crossing time is 1658·8z at 304·635°W.

Each 25 orbits the time and bearing of the crossing at the equator may be found by deducting 6·6 minutes and 1·6°W from the starting datum, which facilitates longer term forecasting. Using Orbit No. 300 as above, Orbit No. 325 will cross at 1457·2 on a bearing of 274·3°W. Given a starting point, therefore, and using some simple arithmetic, predictions can be made for some time ahead.

To start the ball rolling, Orbit No. 660 on January 9, 1975 will cross the equator at 0842·0z on a heading of 180·5°W and you can take it on from there. There may be small changes measured as more precise data become available and we will keep you up-to-date with these throughout the three years predicted life of the satellite. They will in any case be very small and only if the figures given here are used for forecasting months ahead without amendment will they become significant.

It is emphasised that these data refer to *equatorial* crossings and that where the pass is from North to South the AOS (acquisition of signal) will be some 25-30 minutes later and about 10-15 minutes later when the pass is from South to North. LOS (loss of signal) will occur some 25 minutes after AOS for an overhead pass and at proportionately shorter intervals for more distant orbits.

Operation

Details of the various operating modes and procedures were given in the February, 1974 issue of *SHORT WAVE MAGAZINE* and it should suffice here to give a condensed version of them and note any changes.

Mode "A": 2m/10m repeater operating. Input between 145·85–145·95 MHz with output over 29·40–29·50 MHz and beacons operating on 29·50 MHz and 435·1 MHz transmitting telemetry data. At the present time it is difficult to access the repeater due to the unwanted presence of a 14 dB pad at the Rx input, and it looks as if the 80-100 watts e.r.p. quoted as adequate for access is a bit on the low side. The beacon frequency has been measured as 29·502 MHz at zero Doppler shift and the two watts of output gives a good signal (around S5) most of the time. There is a pronounced Doppler shift, some 5 kHz, on this beacon. This mode is in use on all *odd* numbered dates of the *year* and *not* on all odd numbered dates of the *month* as has been announced.

Mode "B": 70 cm/2m repeater operating. Input between 432·125–432·175 MHz and output over 145·975–145·925 MHz, when 435·1 MHz beacon is off. Note that the downlink passband is inverted. Transmission should be on USB and this implies correct reception on LSB; the transmit frequency must be lowered to raise the receive frequency when netting. Beacon frequency is measured as 145·971 MHz and the 200 mW output is providing good telemetry signals. This mode is in use on all *even* numbered dates of the *year* and not of the *month*. Note also that the original operating schedule for *Oscar VII* showed Wednesdays as off days. This has been modified as above. As with *Oscar VI*, certain stations are using excessive power to access the repeater resulting in shut down or distorted signals. About 300-400 watts e.r.p. is all that is required—say a QQV06-40A and a 14-ele. beam.

Mode "C": Operation on reduced power on Mode "B" with the 2m. beacon only operational.

Mode "D": Both repeaters *off* and telemetry *via* the 70 cm. beacon on ground command.

General Comments

It is early days yet to report individual results with *Oscar VII*, but here are just a couple which have come in: G8AWS has already worked 13 countries on Mode "B," including a couple of very nice contacts with W6 and K6. He runs 30 watts to a crossed 12-element beam on 70 cm. and a crossed 10-element array on two metres, both of which are fully steerable in azimuth and elevation. Sounds the ideal set-up and he is certainly a fine signal here in Herne Bay. G8EOP has worked five countries with 100 watts e.r.p. to a 46-element beam. G3DAH has worked 14 countries (best DX WO) with 30 watts to a 14-element beam on 70 cm. and a 10-element beam for 2m. reception.

For philatelists, AMSAT *Oscar VII* first-day covers postmarked at the launch site in California on November 15 are available from AMSAT against six IRC's and a large, self-addressed envelope. The address to write to is:—AMSAT, P.O. Box 27, Washington D.C., 20044.

There are many ways of recording the telemetry data. An original one was devised by George Sassoon, G3JZK, who takes the RTTY from the Rx on an electro-cardiograph and deciphers it at leisure!

Attention is again drawn to the excellent *Oscar Newsletter* produced by G3WPO and G3IOR. This contains really up-to-the-minute news about both satellites, together with technical data on reception, orbit predictions, telemetry decode and suitable apparatus for use with the repeaters. Some s.a.e's get you in on the act if you send them, with £1, to Tony Bailey, G3WPO, *QTHR*, who will advise you about annual subs., etc.

Have fun with *Oscar VII*—and let us know your results, in detail.

Contests

Results: The results of the VHF/NFD event could hardly have been much closer with the March and District A.R.S. leading by a mere 4% over the Southampton Group. Band winners were: G3FDW on 4m., GW3OXD on 2m., GW3SLJ on 70 cm. and G4BEL on 23 cm.

The Summer 70 cm. Cumulatives brought victory to G3KMS (Bolton, Lancs.) with G3JVL of Hayling Island as runner-up. In spite of generally poor conditions for most of the sessions, several contacts over 300 km. were completed.

The 6th BARTG VHF RTTY contest resulted in a win for DJ1QT/P with more than twice the score of the runner-up, DJ8EA—and small wonder really, since he was operating from a lighthouse with an antenna feeder run of 90 metres! The leading British station was G3OUF, who took fourth place. The BARTG will be reviewing the question of differing operating speeds, which caused no small amount of confusion, when they come to formulate the rules for next year's event.

Reports: Conditions contained to be no more than average for the 4m. Cumulatives of November 10 and 17, were poor for that on November 24, but perked up a bit for the December 1 session.

Conditions were variable for the 144 MHz Fixed Station event on December 8, being much better in the late afternoon than at the start. Pressure was up to 1022 mb during the day (for a change!) and some good DX was available, including a small amount of Continental activity. Scores over the 100 mark were fairly common, but the best heard was that of G3VLG in Leicester who had over 200 contacts.

By and large, one is left with the impression that propagation on all the VHF/UHF bands, certainly during most contests, has been much poorer this year than last. There have been no stable periods of high pressure of any significant length, and the dreary succession of "Lows" from the Atlantic, are undoubtedly the cause. The poor level of activity, local and DX, indicates the reluctance of many operators to call CQ into what may appear to be an "empty band," instead of treating poor conditions as a challenge. One has only to listen to some of the regular skeds to hear what can be done when the bands appear to be flat.

Linear Amplifiers

Attention was drawn recently in this Column to the misuse of linear amplifiers, particularly on two metres, and some suggestions were made for improving the situation. The notes attracted the attention of Robin Harvey, G4BBR, who runs full legal power on both 2m. and 70 cm. using a

TWENTY-THREE CENTIMETRES ALL-TIME TABLE

Station	Counties	Countries	Total
G4BEL	24	7	31
G3JVL	20	4	24
G3DAH	20	3	23
G8ARM	20	2	22
G4BYV	15	5	20
G3COJ	15	3	18
G3JXN	17	1	18
G4ALN	15	3	18
G3EHM	14	2	16
G8AOD	11	2	13
G5DF	11	1	12
G8FMK	10	1	11
G3NHE	8	1	9
G8FJG	7	1	8
G8EOP	1	1	2

We should very much like to see more entries for this Table, not only from the competitive point of view but also to give an indication of where activity on this band lies. So how about it?

THREE BAND ANNUAL VHF TABLE

January to December 1974

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3NHE	56	6	74	18	56	11	221
G3DAH	51	8	63	18	35	9	184
GD2HDZ	41	6	80	13	36	7	183
G5DF	44	7	65	16	37	6	175
G4AGE	29	4	67	11	42	8	161
G3XDY	28	4	72	12	20	8	144
G8EOP			71	13	42	10	136
G3OHH	46	7	56	11	12	2	134
G3FIJ	30	4	44	13	15	4	110
GM3ZBE	28	4	48	13	4	6	102
G3BW	—	—	65	10	22	4	101
G4CZP	—	—	79	14	—	—	93
GW8FOL	—	—	75	16	—	—	91
G4AEZ	15	2	46	11	13	3	90
GW8FKB	—	—	77	10	1	1	89
G4BMM	8	2	45	11	19	4	89
G8GHZ	—	—	67	10	9	1	87
G8HBQ	—	—	61	9	12	3	85
G3SHY	15	3	27	6	23	5	79
GM4CXP	—	—	67	12	—	—	79
GW3KGD	—	—	64	15	—	—	79
G8GNE	—	—	40	10	23	3	76
G2AXI	21	3	32	8	9	1	74
G3AHB	—	—	55	10	7	1	73
G8ECO	—	—	49	9	12	2	72
G8DGR	—	—	52	11	4	1	68
GW8BXQ	—	—	52	12	1	1	66
G8FMK	—	—	27	2	34	3	66
G4DHF	—	—	56	9	—	—	65
GI8EWM	—	—	52	9	1	1	63
G8FWB	—	—	51	10	—	—	61
G8HHI	—	—	51	10	—	—	61
G8GGP	—	—	50	9	—	—	59
GW8HVP	—	—	48	8	—	—	56
G3EKP	21	7	15	4	2	2	51
G8FUI	—	—	35	8	5	2	50
G8CBU	—	—	42	5	—	—	47
GW4BXE	12	2	20	11	—	—	45
G8HQA	—	—	37	7	—	—	44
G4DNJ	—	—	32	5	5	1	43
G8GLS	—	—	36	6	—	—	42
G8BBP	—	—	37	5	—	—	42
G8GXE	—	—	29	5	1	1	36
GW3XJQ	—	—	27	9	—	—	36
G3FKP	—	—	29	2	—	—	31
G8HYH	—	—	27	4	—	—	31
G8BPJ	—	—	23	2	1	2	28
G3SXK	—	—	21	6	—	—	27

Notes:

(1) Claims should be on the basis of the *OLD* county boundaries until December 31, 1974.

(2) The Tables show claims to date from January 1, 1974 and closed on December 31, 1974.

(3) From January 1, 1975, the new county organisation for England and Wales will be used in the compilation of this Table. Throughout 1975 Scottish counties will remain unchanged for the purposes of this Table.

(4) Claims should be sent to "VHF Bands," *SHORT WAVE MAGAZINE, BUCKINGHAM, MK*18 1*RQ*.

(5) Please start sending in your claims as soon as possible after the start of the New Year.

pair of 4CX250B's, and he has sent in some useful supplementary hints on setting up a linear, an abridged version of which is reproduced here with due acknowledgment to him.

(1) Ensure that the tetrode amplifier is neutralised and free from parasitics,

(2) With appropriate heater, anode and screen volts applied, adjust the DC bias for the recommended zero signal value of anode current,

(3) Connect a suitable dummy load and set the loading control for rather heavy loading,

(4) With a single-tone source, increase the signal drive until a small change in screen current is noted,

(5) Resonate anode circuit for a positive peak in screen current,

(6) Resonate the grid circuit for a peak in anode current,

(7) Increase drive until either the desired value of single-tone screen or anode current is reached, whichever comes first,

(8) Without drawing grid current, adjust loading, anode tuning and drive level to duplicate as nearly as possible the data sheet conditions. Anode current will increase with drive and screen current will peak at resonance but *decrease* with increased loading,

(9) Connect an aerial and repeat step (8) by adjustment of anode tuning and loading with the same drive level as before,

(10) Apply SSB input and adjust audio gain for highest output on voice peaks without drawing grid current or flat-topping.

Now this is all good stuff and little need be added to it except, perhaps, to say that screen current in a tetrode linear is a *most* sensitive indicator of correct operating conditions, and that when setting-up, and preferably permanently, a screen current meter is a great help in assuring a clean signal. A dummy load is pretty easy to construct, and if you don't want to make your own, there are commercial models available—but using one does make things easier and will eliminate all the huffing-and-puffing and whistling which pollutes the air all too often. It may be noted here that neither the QQV06-40A nor the QQV03-20A has a manufacturer's rating for VHF SSB service!

Beacons and Repeaters

GB3PI and GB3BC are now well established and are licensed for one year. GB3MH (Malvern Hills) should be ready to go by the end of the year. They have been having a spot of receiver trouble. The London repeater, GB3LO, has been heard testing from Crystal Palace, the tests at Epsom having been satisfactory, although marred, by deliberate jamming! (We have some "nice" people in our midst, even on VHF). It is reported that the aerial feeder problem has been sorted out and that operation should commence before the end of the year.

The same date is applicable to the Hampshire repeater, GB3SN, located at Four Marks, near Alton, which has been heard radiating a callsign and long dash, so is presumably undergoing air test. Other repeaters are being planned or are awaiting the grant of the licence by the Home Office, and details will be given here in due course.

Just a reminder about frequencies: GB3PI and GB3BC input channels are on R6, 145·15 MHz; GB3LO and GB3MH on R7, 145·175 MHz; and GB3SN on R5, 145·125 MHz—where the "R" nomenclature is that specified in the IARU Region I Band Plan. The output frequencies are, in

every case, 600 kHz higher.

There is strong Continental pressure for beacons on Two to be allocated frequencies around 145·0 MHz as well as at the bottom end of the band, where they could well interfere with DX CW operation. *Everyone* seems to be in favour of having beacons as "guides to propagation conditions"—but nobody wants them on their own doorstep!

Plans are in hand for the establishment of 70 cm. beacons at Chelmsford. Luton. Liverpool, Cambridge and Crowborough, but reality is far away as yet.

A new departure for beaconry is likely to reach fruition by the end of the year in the operation of a 10·1 GHz installation on the Isle of Wight under the care of G3KSU. Initially, the output will be of the order of 80 milliwatts but it is planned to increase this to 2·5 watts later. The antenna is to give 11 dB gain from a slotted waveguide and will radiate a 1 kHz tone with a frequency deviation of ± 500 kHz. Beam heading will probably be along the South Coast eastwards.

VHFCC Awards

We are pleased to welcome GI8HXY to the Club and to award him Certificate No. 228 for two metres from Co. Down. Norman Henderson has been licensed since August, 1973 and runs a Pye AM10D for local contacts on AM and a Liner-2 for DX working. The QTH is approximately 400ft. a.s.l. with a fairly good take-off in all directions for the 8/8 slot-fed Yagi. The QSL return rate has been very poor at around 40%.

A no less cordial welcome to Maurice Wickham, GW8FQF (Pensard, near Abergele) who gets Certificate No. 229, again for 2m. operations. He was first licensed in February, 1972 and did quite a bit of /M and /P work for the first year using Pye equipmenton bo th 2m. and 70 cm. At home, he also runs Pye gear with a BRT-400, modified for FM/AM with a Telford converter. The 8-ele. Yagi for 2m. is at 32 ft. and the 46-ele. for 70 cm. at 36ft. The QTH is at zero feet a.s.l., just south of the beach, with 800 ft. hills from East to West through South. He says that it is quite a feat to work even the GM's when the tide is high! In January, 1973 he got himself a Liner-2 and found DX much easier with best DX to date as HG5 during the sporadic-E openings recently. The 70 cm. gear runs about 5 watts output from a QQV03-20A and best DX is with Kincardineshire. He hopes to have 70 cm. SSB going shortly and will follow that with 23 cm.

Finally, greetings to G4APL of Caterham, Surrey, who gains award No. 230 for 2m. work. Paul was first licensed in September, 1970 as G8DYZ after spending some years as an SWL on the HF bands, becoming G4APL two years later. An HW-17A, modified for AM/FM transmit and receive, is doing good service and is supplemented by a liner-2 for SSB and CW. The Rx set-up consists of a Mosfet converter and an HRO-500, the 14-ele. Parabeam being on a Versatower at up to 50ft.

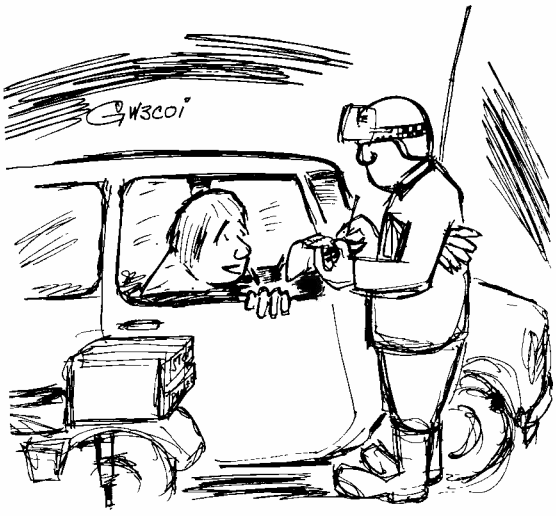
View from GM

Considerable thought is being given in Scotland to the selection of simplex calling and working channels for fixed-frequency FM working. The IARU Band Plan, accepted by all countries in Region I, allots four channels at 25 kHz spacing (designated S20-S23 in ascending order of frequency) between 145·50 and 145·575 MHz. Channel S24 on 145·60 MHz, shown in the Plan as a simplex channel, is also annotated R0, the lowest of the repeater output frequencies, although this implies that the repeater *input* frequency would then be on 145·00 MHz, and by local agreement, this channel will be avoided in view of its country-wide use as a mobile calling frequency.

The Central Scotland Group recommends S20 (145·5 MHz) as the calling channel with S23 and S24 as the working frequencies. This is at variance with the practice in the South where 145·0 MHz remains a popular calling channel, very much abused by many fixed and mobile operators who treat it as both a calling *and* working channel. S20 (145·5 MHz) is the allotted calling channel with S21 (145·525 MHz) and S22 (145·575 MHz) as working channels. Some use is made of S24 (145·6 MHz) in Scotland and the North of England. The situation is further complicated by the practice in the South of allotting frequencies to Zones on a fairly arbitrary basis.

Your scribe does not wish to enter the arena and do battle with opposing factions as to which channel should be used for what purpose and where, but it does appear that the well-equipped mobileer must now be prepared to fit channels S20-S24, also 145·0 MHz and one or more repeater channels if he travels frequently over any great distance. A very expensive process, and one which, in any case, cannot be applied to all FM equipments in current use. It looks as if some centralised co-ordination is required here.

GM3GEC is pressing on with his 10 GHz transceiver and he and GM3OXX are busy selecting sites for the 1975 expeditions. GM8BJF has nearly completed his 2m. solid-state transceiver built around the Plessy IC's. It incorporates a phase-locked oscillator and a digital frequency synthesiser switched at 10 kHz. GM8HUM is now GM4DQK but will not be deserting VHF. The recent 90 m.p.h. gales in Scotland brought down the antennas at GM3BQA from 80ft. to ground level.



" . . . could help you with your enquiries if you stood on the near-side—you are detuning my whip . . . "

General News

G8FMK puts forward the idea of an AM calling channel for 2m. and 70 cm., pointing out that there are already calling channels for SSB, CR and FM, and suggests 144·3 MHz and 432·3 MHz as possible frequencies. If such an idea were adopted, use of these channels might be extended to create an "All Phone Modes" channel which would stimulate cross-mode contacts, particularly for users of apparatus with restricted coverage, such as the Liner-2.

G3LQI puts in a plea for more CW on the VHF bands—a point we have been trying to get across for years—and goes along with the idea of a CW calling channel. A frequency of 144·12 MHz has been suggested, and it seems worthwhile giving this a trial. It is to be hoped that, if this finds general favour, it will be borne in mind that it is a *calling* and not a working channel, and that once contact has been established a quick QSY is called for!

Apologies go to GD2HDZ for reporting last month that he had a sked on 23 cm. with PAØSSB—it is G3JVL who has it. Arthur still has some way to go before he is fully equipped for the 23-centimetre band.

Deadline

Christmas and the New Year intervening, we shall have to tighten up the deadlines for the next two issues. You should get this copy by Friday, January 3, 1975 and readers deadline for the February issue will be **January 10, 1975.**

Please remember to send in your scores for the last of the 1974 Three-Band VHF Tables as soon as possible after December 31, 1974. Address as usual is: "VHF Bands," *SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ.*

All the best for the New Year and bags of good DX. *Vy* 73 *de G3DAH.*

THE MONTH WITH THE CLUBS

By "*Club Secretary*"

(Deadline for February issue: January 9)

FREQUENTLY one reads a comment, either in a letter to this piece, or in a newsletter, that the writer can't understand why more of the locals aren't in the group? "We put on a good programme, we have a good club room, a good station available, etc., etc.," so what's wrong?

Basically, *nothing*! The chap who makes the comment is just forgetting about human nature; some of us are "clubbable." Others, more introvert, feel unhappy in a large gathering like a party or Club meeting; yet others like being members but the thought of being "on the committee" and so in some way responsible if the Club folds worries them. Yet others would serve on the committee quite happily but baulk at being asked to act as secretary, treasurer or chairman simply because it involves a basic form of public speaking which is a bit frightening in cold blood—or even because they are afraid they would stumble over reading the minutes of the last meeting. These are real fears, not to be dismissed lightly, and they are part of that rich variety in people which accounts for some of us being DX'-hounds, some craftsmen constructors of the highest order, some rag-chewers on the local-natter bands, some rabid contest operators and so on.

One would think that if a Club were to look at its "catchment area" with *Call Book* in hand, and count up the potential licensed membership in the area, compare it with the total number of licensed members actually in the Club and fairly regular attenders, then a ratio of better than half of the locals actually in the Club is pretty fair going—and the proportion of SWL's likely will be about the same unless there is some special attraction, such as a Club-run R.A.E. or Morse class.

What then accounts for some "country" clubs being so strong—one thinks of Spalding, for instance, or Shefford—despite their apparent lack of potential members? Usually they have a large number of associates who do not live locally but pay membership dues because they want to read the newsletter or because the junk sales are well worth a visit, when there is often test-gear from some local firm being disposed of, or some other such special reason; but we will take a bet that normal attendances are not a great deal above the norm we have postulated.

However, we must come down to the matter in hand, namely, what's going on in January 1975.

Midlands

January 21 is the date for **Solihull**, at the Manor House, High Street, Solihull; the speaker will be G8DNF, giving his well-known talk on the DX-pedition to Andorra. We notice the start time is given as 7.30—no doubt this is to get the business out of the way prior to the talk, so it would be a good thing as well as a courteous, since the speaker is coming from far afield, to be there on time. Visitors are specially welcome to this one.

It should be an interesting evening on January 17 at **Melton Mowbray**, where G3FXP will be talking about the History of Telegraphy—after all, even the phone-only merchants must realise that telegraphy was that which laid the ground-work of technology, enabling telephony to become practical. The venue is not stated, but we seem to recall it as being the St. John Ambulance building in Melton Mowbray—doubtless G3NVK will be only too pleased to tell you if you get in touch with him, as Panel.

Annual general meetings are in the air at this time of year, and **Spalding** run true to form in this, with theirs on January 10, at the "Ship Albion," 7.30 p.m. With a membership of 160, no less, they hope for a good turn-out.

One way of getting to know the latest about the **Derby** doings is to listen to Radio Derby on Wednesday mornings (VHF or medium-wave channels). This is the way to rake 'em in, by preaching not only to the converted (*you*, dear readers!) but also to the Great British Public. Let's see what goes on in January at 119 Green Lane: on the 1st there is a Surplus Sale, followed on the 8th by a retrospective view of the year; this one is also a Ladies' Night. January 15 is down for a Film Show, and on the 22nd Mark Edworthy will be talking about Integrated Circuits. The last meeting of the month—January 29—is, as usual, a Junior Night.

Another Year-in-Retrospect session occurs on January 3 at Derby **Nunsfield House**, who have their Hq. at Nunsfield House, Boulton Lane, Alvaston, Derby, and it is followed by a Junk Sale (this must be a pre-organised plot to keep the stuff circulating round Derby and district!) on January 10. A Night on the Air is down for January 17, and a display of homebrew, kit-built, and commercial gear occupies January 24. That leaves January 31, for a Technical Film Show.

"Amateur Applications of Integrated Circuits" is a fine title for a lecture; and who better to give it than G4CLF of Plessey Components, Ltd., who make those useful linear and communications IC's. As for who he gives it to, this is the **Sheffield Amateur Radio Clubs** amalgam, on January 6 in Room 3106 of Sheffield Polytechnic. This "super-group" is made up from the *Sheffield* Club itself, the *Polytechnic* group and the *Sheffield University* Society—one notes they have "individual" members from Worksop and Rotherham and a couple of otherwise non-affiliated members. Seems a good idea for a group of Clubs to get together in this sort of way once in a while, to attract lectures of a very high standard.

At **Nottingham**, they have five meetings for January—on the 2nd, 9th, 16th, 23rd and 30th—all at their regular gathering ground, Woodthorpe House, Mansfield Road. With 60 or so fully paid-up members, secretary G3AFJ feels that they are now out of the doldrums of some years ago. The Morse class attracts 15 members. They would like their existence made known to the many licensed amateurs in the Newark-Mansfield-Worksop area who have not yet joined.

Bromsgrove gather at the Avoncroft Art Centre on Jan. 10, Feb. 14 and March 14 and this Club made an entry in the November MCC.

Bedford now have a regular room at the United Services Club and soon will be able to instal HF/VHF gear for G3WTP, their own station. There are five regular meetings scheduled for January, on the 2nd, 9th, 16th, 23rd and 30th, all of which involve lectures or discussions on subjects of prime interest to the radio amateur—we note "Insurance for the Amateur" (Jan. 2) and "RF Radiation and its Effects" (Jan. 23). The February meetings are weekly on Thursday evenings.

Wolverhampton, one of the strongest Clubs in the Midlands, with quite a solid membership and a good *Newsletter* get together at Nechells Cottage, Stockwell Road, and for January have no less than nine meetings scheduled, one of which to catch our eye being "Looking at Magazines, Books and Advertisements," on Jan. 16. (We would be interested to hear what G8GCV says on the subject!). The Club Project involves the construction of a simple HF beam array. The current *Newsletter* carries a well-observed report on the Leicester ARRA Exhibition, with some shrewd comments (with which we are in agreement!).

Up North

Although the **Bury and Rossendale** meeting is on the second Tuesday in each month at the Mosses Community Centre, Cecil Street, Bury, on every *other* Tuesday there is an informal get-together, with class tuition in Morse and R.A.E.

Bolton use the Clarence Hotel, Bradshawgate, and have the AGM there in January. However, no date is given, and also there is a hint of a change of Hq.—so if you intend to go, perhaps it would be best to contact the secretary first.

It is some Hq. they have at **White Rose**; Shack, Workshop, Library, Lounge, and Canteen, all at 83 Town Street, Armley, Leeds. Here they can be found on any Wednesday, but we notice in particular a lecture on Coil-Making by G3WFS on January 8, and the AGM on January 29. For this last, nominations must be in writing and handed to G3VTY a week before.

Over the Border now, to **Mid-Lanark**, at Wrangholm Hall Community Centre, Jerviston Street, New Stevenson, Motherwell. They seem to aim to make it a formal activity of some sort on alternate Fridays, with a natter session on the "blank weeks"; they say this is to make up for not gaving the chance to natter at lectures! At all events, we see January 10 is down for "The Joys of Home Brewing"—not the alcoholic stuff but the electronic brews, GM8CFI-made. January 24 should bring some sparks—"The Black Box Debate." Looking ahead a little, we see GM3KJP will be demonstrating aerial and feeder measurements, using both home-constructed and professional test-gear—this should be an interesting and very instructive evening. The February 7 date covers this last, leaving the 21st for the Annual General Meeting.

All members and potential visitors to **Wirral** are asked to note that the January dates are put back one week; so the meetings will be on January 8 and 22. The exact details are not firm, but will be including a talk by G3VEB, a film show, and another Surplus Sale before the end of February, if all goes well. The Hq. is at the Sports Centre, Grange Road West, Birkenhead.

The usual heavy list of activities appears in the report from South

Spalding & District Radio Society put on an impressive stand for an exhibition at the opening of their local civic centre. Numerous items of home-built amateur band gear were displayed along the bench and included, at the far end, a CC/TV system. Among the Club operators were G3PVR, G3XBS and G400, with much SWL assistance. Spalding is one of the most active Clubs on our list.
Picture courtesy "Lincolnshire Free Post"

Manchester. Monday evenings are at the club shack, "Greeba," Shady Lane, Manchester 23, for the VHF lads to foregather; in addition the full strength of the group is deployed every Friday at the Sale Moor Community Centre, Norris Road. In more detail, we see on January 3, G8MDJ talking about the GM3UCB DX-pedition. On January 10 they have a tape talk by G3IOR entitled "Some Further thoughts on Propagation—was Marconi right?" After that thought-provoking event, on January 17 they have a look at the progress of the Club project. January 24 sees them talking about Frequency Measurement and Frequency Standard transmissions, G3HZM handing out the "gen." To round it all off, there is a Night on the Air on January 31.

The **Harrogate** group have a new Hq., Christ Church Further Education Centre, Church Square, where they meet every Monday evening, 7.30 p.m.—they can operate all bands Top-to-Ten using a KW-2000A.

We must now head way up into GM for **Glenrothes** where the Club have a place at Douglas Road, Leslie, Fife, to get together every Wednesday evening. For January 5 we notice they have a Film Show, the title of the film being The Moving Spirit.

Westward Ho!

No, we don't mean that a group has surfaced in that golfer's and boating paradise—the nearby one is at Barnstaple, **North Devon** for which one should contact G4CG address as Panel. Rather are we referring to the geographical grouping involving Wales and the West Country.

For instance, there is **Cornish**, which is about as far West as one can go. They have an intriguing title for January 2, namely, G3XTF's "Chemistry in Radio." If you want to look them up on this occasion, head for the SWEB Clubroom. Pool, Camborne, Cornwall.

Yeovil never give much indication of their activities; they just remind us that on any Thursday evening you can find them at the Youth Centre, 31 The Park. However, they must have made a new-year resolution this time, as we see for January 9 a Junk Sale, and again on January 30, a tape lecture.

Back towards the Midlands, we come to **Hereford** but their December *Newsletter* gives us no clue as to meetings in January—however, the secretary of this active group is G4CNY, who will be able to give you all the details. We gather from said *Newsletter* that they are going well, with interesting talks and visits. A social evening is in prospect, for which suggestions are requested from members. The Club runs a monthly Heard/Worked column covering the HF/VHF bands, some 14 members participating.

Southrons

January in **West Kent** means the 10th and 24th at the Adult Education Centre, Monson Road, Tunbridge Wells; the first date sees G3VEH of the Pye Telecomms repeater group talking about GB3PI, and on the later one G3JIX is to discuss radio methods used in Astronomy. In between these formal sessions, on the following Tuesdays there are meetings held at the Drill Hall, Victoria Road, Tunbridge Wells.

Acton, Brentford & Chiswick must be noted next—one of our most consistent reporters to this piece. January 21 is the important date, being the Annual General Meeting. Venue, as ever, is the Chiswick Trades and Social Club, 66 High Road, Chiswick, London, W.4, starting at 7.30.

Although their Hq. is at the Loval Hall, Silver Street, Newport Pagnell, the group we are now mentioning call themselves **Milton Keynes**, acknowledging the existence of the new town. It will be interesting on January 6, as the local GPO representative is coming out to talk about tracing interference.

An illustrated talk on Ascension Island is set for January 2 at **Maidenhead**, the speaker being from the BBC. Then there is January 21, when the Club's new receiver will be demonstrated and explained to the membership by G3VCT. Maidenhead group get together at the British Red Cross Hall, The Crescent—and refreshments are provided.

Activity, we hear, is on the increase at **North Kent** with attendances steadily climbing; they foregather at the United Reformed Church Hall, Bexleyheath Clocktower, the entrance being in Chapel Road, on the second and fourth Thursdays each month. January 9 is mentioned in the *Newsletter* as being the date on which the firm of Homer & Whitbread (G8IWX and G8AYN) will be there to demonstrate their range.

Not so far away is **Cray Valley**; they have booked their room for January 2, for a talk and demo. by Walters & Stanton of the Swan line, aerials and the audio gear they handle. On January 16 there is a natter evening. Hq. is at Eltham United Reformed Church Hall, 1 Court Road, London, S.E.9.

It looks like the second Thursday at **Southgate** if they stick to the routine indicated for previous months; they will foregather at the Scout Hut, off Wilson Street, Winchmore Hill Green, N.12. As the December session is the AGM, we can hardly expect to know just yet what is planned for that January date.

"Multipliers and Amplifiers" come to **Crystal Palace** on January 18, the proceedings being in the able hands of G3OOU and G8HAX. Start at 8.0 p.m., Emmanuel Church Hall, Barry Road, London, S.E.22.

The third Tuesday seems to be the evening for Surrey to gather at the Ship Inn, High Street, Croydon—if the last few months are anything to go by they certainly have a fine selection of speakers lined up.

A warning note sounds in the **Sutton & Cheam** *Newsletter* to hand. It seems that the husband-and-wife team, G4DDY and G4CCY, had their Storno two-metre gear swiped from the car, though it was very clearly marked (by modifications) as being amateur equipment. The fact that the station log and *nothing else* was taken at the same time suggests that the specialist in stolen Amateur Radio gear is getting going in this country, something previously unknown. To revert to the group, they have their Hq. at the Library, Cheam, where on January 21 G3CDK will talk about his experiences with "Repeaters—and Other Things!"

Farnborough work well ahead of time, which enables us to look at the front page of their *Newsletter* and see that on January 8, G3TMQ will be giving a talk on Frequency Synthesis. Look for them in the 8th Farnborough Air Scouts Hut, Rectory Road, on the second and fourth Wednesdays in each month.

Not very often we hear from **Oxford** (University Radio Society) who hold their sessions at the Mansfield Road Club, on the second and fourth Wednesdays of each month. They who would like to see visitors or intending members there.

As it is the AGM in December, no doubt the committee at **Verulam** will be rapidly picking up their new jobs and fixing up something for the January meeting. This, if current form is anything to go by, will be at the Market Hall, St. Albans on January 15.

The **Maidstone** group, with their own well-known callsigns G3TRF/G3YSC have four meetings—on January 3, 10, 17 and 24—during the coming month, all at the Sportscentre, Melrose Close, help for Beginners being featured on the 3rd and 17th.

According to G3KDL, their secretary, the Radio Society of Harrow has meetings at the Sea Cadets Hq., Woodlands Road, on January 3, 10, 17, 24 and 31—another Club with regular weekly meetings, with much going on of interest to members. Their president is the well-known old timer, Bill Corsham, G2UV, who is credited with the invention of the QSL card—over the years since, it has often been suggested that this is an innovation which, in the Amateur Radio context, might better never have been conceived!

Echelford run nets on Top Band, Eighty and Two Metres and produce a comprehensive *Newsletter* covering members' activities. They are having trouble with "a couple of jokers" (*sic*) who are creating QRM for them on Top Band—however, there are now D/F receivers going to locate the source of the bother.

Special Interests

This heading is to cover those groups who cater for special categories of amateur. First on the list is **A.R.M.S.**, for the mobile operator, in any part of the country or indeed the world where /M type working is permissible. For details, contact G3FPK, as Panel.

WAMRAC is for those amateurs and SWL's who are Methodists, basically, albeit they will accept members from any Christian denomination. There seems to be quite a lot of Wamrac activity on the air, by way of nets and skeds, mainly on Eighty as far as U.K. goes, but some on Twenty and VHF.

Finale

This is the lot for this month. We have done our best to take in all possible material that came in to time, despite an unexpectedly fierce printing schedule—but a packet of eight reports was caught in the post and delayed past the last moment for inclusion. These will be included next time round.

Please, then, your news for February—dates, Hq. addresses and such details, to arrive first post on **January 9**, addressed to "Club Secretary," *SHORT WAVE MAGAZINE, BUCKINGHAM, MK-18 1RQ*. And a Happy New Year to all who follow this piece.

Names and addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W3-8LB.
A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey, CR2-1EZ.
BEDFORD: S. Felts, G8FMG, 6 Whitelodge Close, Kempston, Bedford (*852414*), Beds.
BOLTON: F. R. Hamilton, 329 North Road, Atherton, Manchester, M29-0RF.
BROMSGROVE: J. Dufrane, 44 Hazelton Road, Marlbrook, Bromsgrove, Worcs.
CORNISH: H. Webster, G3XTF, Crandale, Gillyfields, Redruth (*6905*), Cornwall.
CRAY VALLEY: P. F. Vella, G3WVP, 78 Hurst Road, Sidcup, Kent.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London, SE23-3BN (*01-699 6940*).
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby (*21931*), DE3-7GE.
DERBY (Nunsfield House): I. Cage, G8GBV, 25 Petersham Drive, Alvaston, Derby, DE2-0JU.
ECHELFORD: A. J. M. Wenham, G3ZXA, 28 Pine Wood, Sunbury-on-Thames (*86440*), Surrey.
FARNBOROUGH: R. C. Bagwell, G8ECO, 33 Frimley Green Road, Frimley, Camberley, Surrey.
GLENROTHES: A. Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fify, KY1-2LH.
HARROGATE: D. Boniface, G8IBB, 11 Holmefield Road, Ripon, North Yorkshire.
HARROW: L. D. E. Light, G3KDL (*address wanted*).
HEREFORD: S. H. Jesson, G4CNY, 181 Kings Acre Road, Hereford.
MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead (*20107*), Berks., SL6-5LA.
MAIDSTONE: G. Taylor, G4BNI, 26 Valley Drive, Loose, Maidstone (*43976*), Kent.
MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray (*3369*), Leics., LE13-1TZ.
MID-LANARK: D. H. Plumridge, GM3KMG, 7 Waterside Gardens, Hamilton (*28759*), Lanarks, ML3-7PY.
MILTON KEYNES: T. M. Rabbitts, G8HUH, 39 Vandyke Close, Woburn Sands (*583706*), Milton Keynes, Bucks., MK17-8UU.
NORTH DEVON: H. G. Hughes, G4CG, Grinnis, High Wall, Sticklepath, Barnstaple, Devon.
NORTH KENT: R. Wells, G4ARQ, 12 Bulbank Road, Belvedere, Kent.
NOTTINGHAM: G. Dover, G4AFJ, 21 Greenwood Avenue, Nottingham, NG3 7FX.
OXFORD: C. R. Mitchell, G8IUU, 85 Howard Street, Oxford (*44064*).
SHEFFIELD (Amateur Radio Clubs Association): P. Day, G3PHO, 39 St. Albans Road, Sheffield (*306956*) 10, South Yorkshire.
SOLIHULL: L. G. Boswell, G4AEJ, 170 Kestrel Avenue, Yardley, Birmingham, B25-8QX.
SOUTHGATE: B. Oughton, G4AEZ, 48 Morley Hill, Enfield, Greater London.
SOUTH MANCHESTER: D. Holland, G3WFT, 7 Alcester Road, Sale, Cheshire, M33-3GW.
SPALDING: R. Harrison, G3VPR, 38 Park Avenue, Spalding, Lincs.
SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, CR2-8PB (*01-457 3258*).
SUTTON & CHEAM: A. Keech, G4BOX, 26 St. Albans Road, Cheam, Sutton, Surrey.
VERULAM: H. Young, G3YHY, 93 Leaford Crescent, Watford (*25633*), Herts., WD2-5JQ.
WAMRAC: L. Colley, G3AGX, Micasa, 13 Ferry Road, Wawne, Hull, Humberside, HU7-5XU.
WEST KENT: M. Stanton, G4CCQ, Sweetbourne Cottage, Hastings Road, Lamberhurst (*393*), Kent, TN3-8JG.
WHITE ROSE: K. R. Robson, G3VTY, Flat 7, 34 Saint James Drive, Horsforth, Leeds.
BURY & ROSSENDALE: C. Kirby, G8HQW, 2 St. Peters Place, Haslingden, Rossendale (*4915*), Lancs.
WIRRAL: H. Crofts, G3DLF, 3 Barmouth Road, Wallasey (051-638 2515).
WOLVERHAMPTON: J. P. H. Burden, G3UBX, 28 Coalway Road, Wolverhampton, West Midlands, WV3 7LX.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.

THANET ELECTRONICS

DAVE G8ELP **PAUL G3VJF**

REPEATERS

Repeaters are playing an increasingly major role in VHF mobile activity. Those who live within range of repeaters already operating will know that for successful contacts it is not only necessary to have the correct amount of deviation but also to have adequate clipping to secure maximum talk power without being cut off by the repeater for over-deviating. The audio frequency tailoring should be correct for maximum readability under noisy mobile conditions and there must be a switchable tone-burst generator which does not drift significantly when the rig gets hot.

The IC-22 fulfils all these requirements. If bought from us we fit a switchable tone-burst generator on the standard access frequency of 1750Hz, but this is adjustable (we will do it for you if you like) to 1700Hz, which is required by the pioneer GB3PI and possible future repeaters where co-channel operation is necessary. Alternatively for an extra £4 we will fit two generators and a switch giving you a choice of either frequency. A typical generator does not drift by more than 10Hz over the temperature range 0°C to 50°C thus making it quite unnecessary to use unadjustable tuning forks or to lock your generator to a hydrogen master! Crystals supplied are 145·00, 145·500 and 145·550. Extra channels cost £3·50 each and we have plenty of crystals for all 9 repeater channels on order from Japan. The receiver input sensitivity is high (0·4 uV for 20dB quieting) and cross-modulation and spurious emissions are extremely low. A squelch control renders the receiver silent when no signal is present and a "signal received" light comes on to let you know when you are missing a contact because you have turned the volume control down to keep the XYL happy. At the moment the stock situation is very good.

Of course you have all the advantages of the IC-22 plus the availability of 80 channels, without having to buy another crystal, if you get an IC-225—see our advert.

Please do not hesitate to write or phone us for further details—evening or daytime. We offer credit facilities, or if you have an Access card why not phone your order together with your Access number and your name and address as it appears on the card, before 3 PM and we will dispatch transceivers to you by Securicor the same day subject to stock conditions. We can now accept Barclaycards also.

INOUE IMPORTERS

PRICE LIST — JANUARY 1975

INOUE

IC-210 2m FM Transceiver—fully tunable 144–146 with built-in pnase-locked VFO 240v. AV and 12v. DC	£200·00
IC-22 22 Channel mobile transceiver (3 channels supplied)	£109·26
Extra channels for above	£3·50
IC-225 80 channel mobile transceiver	£195·00
IC-3PA 13·5v. DC Stabilised Power Supply	£41·48

MICROWAVE MODULE PRODUCTS

2m. Converters IFs 2-4, 4-6, 28-30	£15·20
2 Converter 28-30 IF with 116 MHz LO output for transverter use	£16·30
70 cm. Converters IFs 28-30, 144-146	£18·10
2m. Low noise preamp with 2 isolated outputs	£9·00
70 cm. Triplers 2m. in 70 cm. out. Max input = 20W giving 12W out.	£17·50

SOLID STATE MODULES PRODUCTS

Converters 2m. IFs 2-4, 4-6, 28-30	£15·00
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