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SHORT WAVE MAGAZINE

(GB3SWM)

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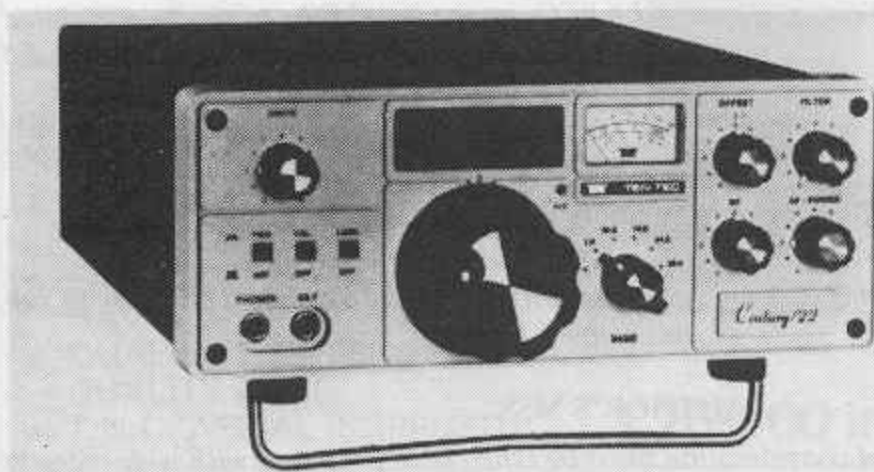
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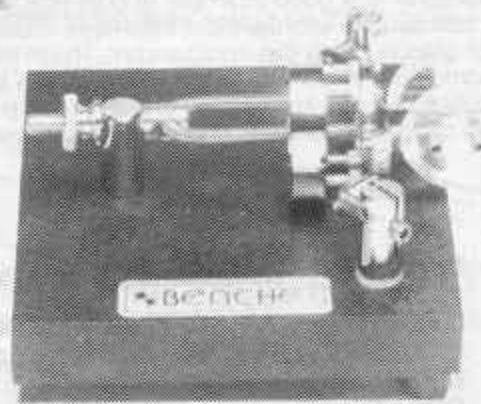
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MTX20 20M QRP CW Transmitter (up to 10W RF)	£21.90	£27.70
CVF VFOs for above TXs (one version per band)	£9.90	£15.90
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Tuning capacitors for the DcRx receiver (except 160M version) are available at £1.50 each, you need two per receiver. One of the same devices can also be used for the CVF.

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73 from Dave G4KQH, Technical Manager.



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FOR THE RADIO AMATEUR AND AMATEUR RADIO



EDITORIAL

IARU, ITU and RSGB

Elsewhere in these pages we have mentioned the Region 2 IARU Conference in Argentina, and what went on. It brings to mind some consequent thoughts. Firstly, like it or not, this hobby of ours is controlled by International Law which applies to us, the Americans, the Russians, the Asians, the Africans, and everyone else. In order to make that law, nations meet, and their delegates vote as their national societies and their authorities have agreed. In U.K. that means RSGB and government departments. No RSGB would mean no representation at meetings, and probably in short order no amateur radio. Various African ex-colonies have been demonstrating the truth of that, as indeed has Albania.

Secondly, there are many forces acting against Amateur Radio, simply because it is so international. For example, those concerned with national security; industry would like to have our bands for its own use, and so would the broadcast industry for putting out propaganda.

The chain is long, but it is continuous: from ITU through member governments to their departments on the one hand, and from IARU through national societies to local groups to individuals on the other. Thus, non-RSGB members can only exist by courtesy of those who pay their subs each year. If RSGB were to go through a situation such as happened with ISWL recently — and while it shouldn't and probably wouldn't happen it is not impossible to conceive of RSGB collapsing — then our licences would be at risk from all these forces.

A strong RSGB is therefore important, and it can be forgiven a few quirks. Nonetheless every member who has tried to telephone Hq and consistently failed to get more than the engaged tone or an 'answerphone' response could wish for easier communication with Hq!

For technical reasons the description of the Morse Practice Oscillator, shown on this month's front cover, has had to be held over for a future issue.

Edwards
G3KFE.

WORLD-WIDE COMMUNICATION

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

RATHER as we thought, the conditions noted last month fell away again, but nonetheless there does seem to be an increasing amount of activity on the sun by way of spots at high latitude. These are the ones pertaining to the new cycle and hence the ones in which we are interested for the future. On the other hand there has been plenty enough going on in the storms, tempests and icy blasts business, and no doubt quite a lot of wire and aluminium tubing will have obeyed the laws of gravity — and it's not much fun putting it all back up again! Perhaps these indoor aerial merchants have a point . . .

For the writer, activity this month has been virtually zero, apart from the Sunday-morning natter with the locals; there just haven't been enough hours in the day, somehow.

Goings On

Several people have noted to *DXNS* that they have worked 5A0AA on 21005 CW. This one seems to be on the level, but there does seem to be a small catch; he is restricted to 21005 CW, no ragchews, no split-frequency working. The operator is said to SP6RI, and the licence has been sent to SP6BZ for onward transmission to ARRL. QSLs go *via* SP6BZ also.

That Peter 1 Is. operation which has been on-and-off is now confirmed as on again; KD7P hopes to get there some time between Boxing Day and January 4, but the story is that he will be on the island for less than 24 hours.

Advance notice of an Aves Is DX-pedition; 16-22 March, using the special call 4M0ARV, to celebrate 20 years of the Venezuelan Amateur Radio Society.

VP8AQT, South Georgia, says *DXNS* was in fact genuine and the operator was G6KFR, Dave Jones. He only made about 150 QSOs during his stay but is keen to try again if the chance should come up. Note that various bulletins got the call wrong, as G6FKR, which must have caused the latter some confusion and pain.

That HV2VO station is now QRT; Bro. Edmund has retired from the Vatican Observatory and the station has been dismantled. Although he is still working at the Vatican, he expects to move to Arizona in the near future.

On the Spratly Is. front, *TDXB* says that DUICK is in the States and trying to drum up financial support for another Phillipine Spratly expedition, but not getting much luck, as the locals don't seem to think much of his last effort from Spratly.

More in the line of history, the G3JKI/5A operation of some years ago has at long last received DXCC credit, after years of patient work getting the necessary documentation out of the 5A authorities by G3JKI.

On the QSLs generated from the various Operation Raleigh activities, we hear that ARRL has been rejecting them on the ground that they were 'shipboard activities.' While everyone can accept that the DXAC occasionally slip up, one would have thought that the amount of paper generated in all the world's press would have been enough to alert them to at least the concept that Operation Raleigh was going to (a) land, and (b) do things, in various places, and that was just what the boys on the ship *had* done. Or don't the DX Advisory Committee read DX newsletters of any sort or even daily newspapers? So — the ARRL are being given *another* dose of paperwork on the general subject of the Operation Raleigh stops — and we hope it won't be too long before you can send in your QSLs again.

If you are looking for Gough Is. the only operator remaining there is Kevin, ZD9CL. This chap is a New Chum as far as amateur radio goes and isn't much into pile-ups. If you go at him too fiercely he may just chuck his hand in, so play it cool — after all he will be there for more than a year.

Top Band

Quite a few of us think that this is where everything interesting in Amateur Radio happens!

If you like this band it must be handy to be a professional tower manufacturer. This is the route chosen by WB9HAD who now has a 160-foot base-insulated tower up in the air, and some six miles of ground radials, plus six thousand-foot Beverages for receiving. That was good for a WAC at 579 or better in a couple of days! Puts us in mind of G3UZZ's operating days at Nash Point Lighthouse in South Wales all those years ago: Andy had an HQ129 and DX-100U rig, which fed a 120' vertical aerial, with three or four over-the-ground radials, and the whole works about a quarter-wave above the sea. A few minutes listen at twilight-time in late summer was a revelation, to put it mildly.

Interesting signals known to be about on Top Band include WB0NAA/YN1, KH6AT, VQ9QA, DU9RG, KG4XO, YN3EO, and P4 Aruba. Incidentally, we gather that the "is Aruba P4 a new

country?" discussion ended up as an 8-8 tie in the DXAC, so it's not!

Probably the prime secret of Top Band operation is being able to hear them. To that end, the writer has been playing around with a simple loop aerial on a frame. It was sparked off by noting how useful a medium-wave loop is on the BBC3 channel when the Test Match Special programme is on — from this location it is severely affected by multi-path fading, and a tendency for either of two outlets to be strongest. In the process it was notable how the loop could 'find' previously unheard BC stations on MW, so I took a few turns off until it hit Top Band. Putting a Hitachi RDF receiver, which has Top Band, into the middle of the loop and tuning the loop's capacitor showed a distinct peak, and I am hoping that the simple loop will turn out to be a worthwhile improvement for Top band reception, despite its not being a screened loop — signals maybe a bit down, but (and this is what matters) noise down far more. Where I think I erred before was in using a pre-amp with the loop — if the receiver front-end noise figure and dynamic range were as good as they should be, then a pre-amp could only be deleterious — and this obvious point had previously escaped me.

Turning to the letter from G3BDQ (Hastings) he reckons that conditions on Top Band were poor to start with, and so much of the exotica that was promised either didn't show up or wasn't getting out well enough. D44BC was hooked a few days before the contest, but no-one heard during this. One evening John was listening for JA on 1910kHz when Z21EV was heard and raised. Conditions improved slowly during the contest as far as Top Band went, but by the end signals were strong but little DX was about. Stations worked included AA1K, W1AB, N1BUG, W2PN, W2FJ, KA2ZPD/AG who was raising a dust but was in New York, W3RCQ, W3FX, W3GH, W3LPL, N4UB/3, N4KG, W4DHZ, N4SF, AA4FF, N4ZC, W4RX, N5WA, N5RZ, K5UR, N5AU, K8MFO, KD8TX, WB8LUA, W9SMY, K9WR, W9TYG, K9HAD, W9HAD, N0DH, VE1BB, VE1BNN, VE1BVL, VE1ZZ, loads of UA9s, UL7s, UL8IWJ, UA0AG, DL1RK/5B4, EA9CE, EA9AM, 4X4NJ, VP2VA, PY1RO and a gem in JA4CQS. The Hungarians have been out in force, thus HA0MM, HA8BUB, HA9MS, HG5A, HG6N, HG9R, while others worked included SV1JG, 4U1ITU, and OH0AM. On the other side, the pub 50

yards up the road seem to have bought a new dishwasher which puts out S9 hash, and there has been the noise from on high as well; but G3BDQ reckons his loops are a godsend when the noises are going well.

Ten Metres

Not a band on which to expect marvels, at the bottom of the sunspot cycle, but it has its moments. G3NOF (Yeovil) made just one SSB contact, with ZS1ABH, but he notes hearing an assortment of Europeans.

The CQ WW (CW leg) yielded the odd contact for G4HZW, with VP2MU, J6DX, EI9FK, NP4A, KP4BZ, UP9A, plus Gotaways FR5EM, LU and OA.

And, of course, as always there is the odd CB operator — to be zapped when he leaks into our bands; the nearest one to your scribe must have got cheesed-off with being detected each time he sneaked up to 28 MHz — he's moved! However, it is still as true as ever that the advent of the modified CB set on 28 MHz, and the increased activity resulting, has helped a lot in keeping our 28 MHz band intact; and — this is the interesting bit — in demonstrating that Ten can be much more productive at the bottom of a sunspot cycle than we ever thought in previous minimum years. Some of the 'dead band' effect noted around 1976 and 1965 as well as earlier cycles could clearly have been attributed to openings being missed purely because of lack of activity. After all, it takes two to QSO, to misquote the old song, and if both ends listen and decide the band is dead neither end gets a QSO. CQs on a really dead band these days may at least net a local or zap a pirate, which makes it more worthwhile; in previous cycles it took real dedication to monitor Ten for hours each day, as for example G3USF did, and at the end of the day find nothing in the log.

The New Bands

Arising from yet more problems with the incoming mail, we don't seem to have any reports. However, we do have some comments in *TDXB* on these bands, from the Region 2 IARU Conference held in Argentina. The conference voted to prohibit SSB from the 10 MHz band, at least until the secondary status of amateurs on the band in some parts of the world is eased. They also endorsed a proposal to prohibit contests and award credits from the band — whether the proposal carries much weight in Region 1 or Region 3 of course is a different matter, but one which we think would be a Very Good Thing — if only to keep the new bands clear of contests or splattering SSB which would be of great help to those who do not like contests or DX-chasing — and to be fair these types are probably in the majority.

Dates — & Callsigns

Still with Region 2, we notice that the conference agreed that the difference between U.S. practice and that of the rest of the world in writing dates caused confusion (U.S. practice is month, day, year, and ours day, month, year). So to avoid confusion Region 2 agreed that QSLs in future will use *their* system, to wit year, month, date, with each expressed as a two-digit number. How dotty can you get? Who is going to (1) write to every amateur world wide, (2) enforce the diktat, or (3) deal with the problem that will arise when we change centuries?

However, there was one ray of light in the deliberations, and that was the acceptance of the ITU preferred system of callsigns when operating in another country, putting new country prefix first then home call, as for instance OY/G3KFE — and don't take that example too literally!

Fifteen

Not really outstanding, says G3NOF. Around 1100-1200z there were a few short-path VK-VU-YC stations, a few Africans around 1500, and Ws 1400-1630, the band dead around 1700. Don made his SSB go out to A22TJ, A4XZF, T50DX, TZ1GH, VE3s, VE3FXT/ZS4, VE3FXT/ZS6, W5UYD, stations in W1-2-4-8-0, and ZD8BBC.

Although for the moment your scribe cannot transmit on the band, improvised 'sniffers' have enabled us to have a listen; what we found more or less agreed with G3NOF's findings, bearing in mind that it is one thing to hear 'em and quite another to raise 'em. On the other hand Don was raising them on his beam while your scribe was listening on his bit of damp string. It is all in the cause of science, though, as part of an exercise aimed at demonstrating the relative worth of individual dipoles each fed with its own feeder, compared with the often recommended arrangement of three dipoles coming together at a common centre to be fed with a single feeder — this being an arrangement which has superficial attractions in the loft-aerials-only station.

DX Windows

The Region 2 IARU conference in Buenos Aires considered the question of DX Windows as the first item. The Region 2 bandplan for Top Band shows CW/RTTY below 1840 kHz, with Phone above 1840; 1830-1840 is designated the CW DX Window, and 1840-1850 kHz the SSB Window. On 80m. the designated DX Window for CW is 3500-3510, and 3775-3800 for SSB. Forty shows a window at 7035-7040 for RTTY, and 7080-7100 kHz for SSB, which of course takes into account that Region 2 (The Americas, essentially) have larger chunks of Eighty and Forty than the rest of us. There was

also at this conference *no* endorsement of the Region 3 conference position which 'recognised the problem of DX and DX-peditions' — those with longer memories will recall us reporting in this piece resolutions to the general effect that Region 3 thought DX and DX-peditions were bringing amateur radio into disrepute. So — two parts of the world think differently about DX!

Twenty

Obviously, when the higher bands are, as it were, *hors de combat* Twenty comes into its own by day; and when the higher bands *do* show signs of life then people look at them and say 'no DX!' and race back to 14 MHz. The result is sometimes entertaining, sometimes comic, and sometimes makes one switch off!

"CDXN" deadlines for the next three months:

February issue — January 7th
 March issue — February 4th
 April issue — March 4th

please be sure to note these dates

For example, the station set up at Baghdad Industrial Fair: after I got fed up of calling him I sat and listened for an hour, and there was an MC on the frequency — in all that time (an hour listening plus the time involved calling) I did not once hear this MC mention his own call-sign. Furthermore it needed a lot of luck to beat ten QSOs an hour, as this MC with the 59+ signal appeared to be equipped with a very poor receiver and just couldn't pick callers out of the pile. In fairness, YI2BIF was doing his best, and it seemed to us that before the policeman got into the act the QSO rate was considerably quicker. There were also several different operators noted on the station at one time and another, each with different degrees of skill, and unless I am totally cloth-eared, different QSL addresses: operator Ali for example was giving Box 24093 Baghdad, while on another occasion we heard what we made out to be a four-digit box number.

G3NOF is, and always has been, the most analytical of the regular correspondents; and we can recall, back in the forties, when Don was still an SWL, how his reports used to appear in the listener columns of the day. He's still at heart and SWL, we think, and he mentions in his letter how the ISWL is being revived by a devoted band. If you are a member of the old ISWL you should have had a letter from the new ISWL; if you haven't, or

you'd like to join, the Hq address these days is 10 Clyde Crescent, Wharton, Winsford, Cheshire CW7 3LA. If you write, please include a stamped addressed envelope. However, we digress. G3NOF found the long path open in the mornings 0800-1000, first to JA, then VK and ZL. The short path opens around noon to DU, KH2, VK, AP, JA, and 9N; West Coast Ws weren't common but a few were noted around 1600. Africans were not at all common, and by 1800 the band was, as it were, blowing out the candle and settling to rest for the night. Nonetheless Don managed to get his SSB to talk to CN11AMV, CU2DG, CU3AU, JA1YWX, JA2IVY, JA4KFA, JF1IST/SU1, JH6IMI, KE6V, RF0FWW, VE7AO, VK0SJ (MacQuarie Is.), VS6DO, W7OAP, ZC4AP, ZL1BRX, ZL2AMP, ZL2AWX, ZL3FO, ZL3MA, ZL6OR (Operation Raleigh), ZL0ADO, 8P6CC, 8R1J, and 8R1RPN.

Eighty & Forty

Our usual reporters on the band are not in evidence this month (post problems

again — but *see* below), so we can be somewhat brief. Various DX stations are known to be about on Eighty, at both ends. For example, the YI2BIF signal was noted, and ZLs on CW and SSB, not to mention the more common-or-garden but still DX'y signals and the local natters. One of the things that is such a pain, though, on this band is the number of operators who overmodulate grossly, to the discomfort of all around. One we heard this very morning from the London area was plastering fully 25 kHz HF of him, to the point where the local chaps were having a struggle with his sideband splash — and yet these same locals had no 'whiskers' at a mile range, so we can't blame the receiver! On the other hand, on Eighty and Forty it is often the case that one comes across old friends at most unexpected times. G3MUI did just that, when he broke into the local net from Bishops Stortford to pass his greetings and 59 reports to your scribe and the others on the net. Nearer the CW end, we have noted the QRP signals — and quite bushy some of them are too — busy working each other and also anyone who was prepared

to winkle them out. In fact, one of the minor pleasures of QRP is the pleasure you give to the QRO operator who has just pulled you through and is amazed that he should have been able to do it.

Finale

For some time now, readers will be aware that we have been having trouble with our correspondence; suffice it to say that our complaints seem merely to produce "It weren't me, guv" attitudes, and closing of ranks at the P.O. in defence. However, from now on, we are changing our methods and this will at worst give us 50% better odds; and if our hypothesis is anywhere near correct we should not only stop the problem but prove beyond doubt where the stuff is being "lost".

However, the deadline for the arrival of your letters next time is in the 'box', and still, as always, addressed to your scribe, "CDXN", Short Wave Magazine, 34 High Street, WELWYN, Herts. AL6 9EQ. And, just think: 1987 should see in the new cycle!

Automatic Identification for the G4DCV Multi-Memory Keyer

PAUL WHATTON, G4DCV

THE author's memory keyer (September and October 1986, *Short Wave Magazine*), provides very comprehensive facilities for meteor-scatter operating. When sending high-speed MS CW it is necessary, in order to comply with U.K. licencing regulations, to identify at less than 20 words per minute. This can be done in a number of ways including turning down the speed of the memory-keyer or by connecting a hand-key across its output. Both methods are not particularly elegant, especially in a keyer that purports to do everything. The author therefore designed this identification circuit which, with only a small modification to the memory-keyer, automatically sends the station callsign at the end of a transmit period. It could also find use wherever a callsign generator is required and can be used with other memory-keyers.

Circuit Description

Figure 1 shows the circuit-diagram, the main feature being a diode-matrix 16 columns wide and 8 columns high. This gives 128 bits of storage, although in practice only 127 can be used. The author's callsign, G4DCV, uses a little less than half this so even the longest call should fit in. (If your callsign is longer than this it is most unlikely that anyone would want to work you on MS anyway!) The sixteen columns are driven by IC3, a 4514B CMOS multiplexer. This device switches one of its outputs at a time high when an appropriate binary address-code is provided on its address pins. By arranging the address lines to be incremented

from 0 (0000 binary) up to 15 (1111 binary) the output will scan along the matrix columns from A to P.

The matrix is decoded by IC4, a 4051B CMOS switching device. This works in a similar fashion to IC3 except that the appropriate input-pin is switched out to a common terminal, pin 3, when an address code is set up on its address pins. Only 3 address lines are needed to select any of the 8 inputs (binary 111 equals 7 decimal). Addressing for both ICs is provided by a 4040B binary counter, IC1, which has 12 outputs, the seven least significant outputs being used to drive IC3 and IC4. At each clock pulse IC1's outputs increment by one and the matrix is scanned from A to P, stepping down a row each time column P is reached. The diodes route 5V from the output lines of the driver to the decoder and thus the output goes high each time a diode is 'seen' in the matrix. G4DCV is shown set-up in Figure 1 and requires 33 diodes; GJ0000/P will need a few more! After the printed circuit boards had been made it dawned on the author that had he included 16 diodes in the output lines from IC3, shorting-links could have been used in the matrix. Such is the joy of circuit-design — at least diodes are cheap!

Clock-pulses are provided by a conventional NAND gate oscillator, IC2b and IC2c, passing through IC2a before driving the counter. R3 should be selected on test, the value given in the table of values produces a callsign at about 18 words per minute. Output 8 from IC1 is inverted by IC2d and used to gate IC2a, the

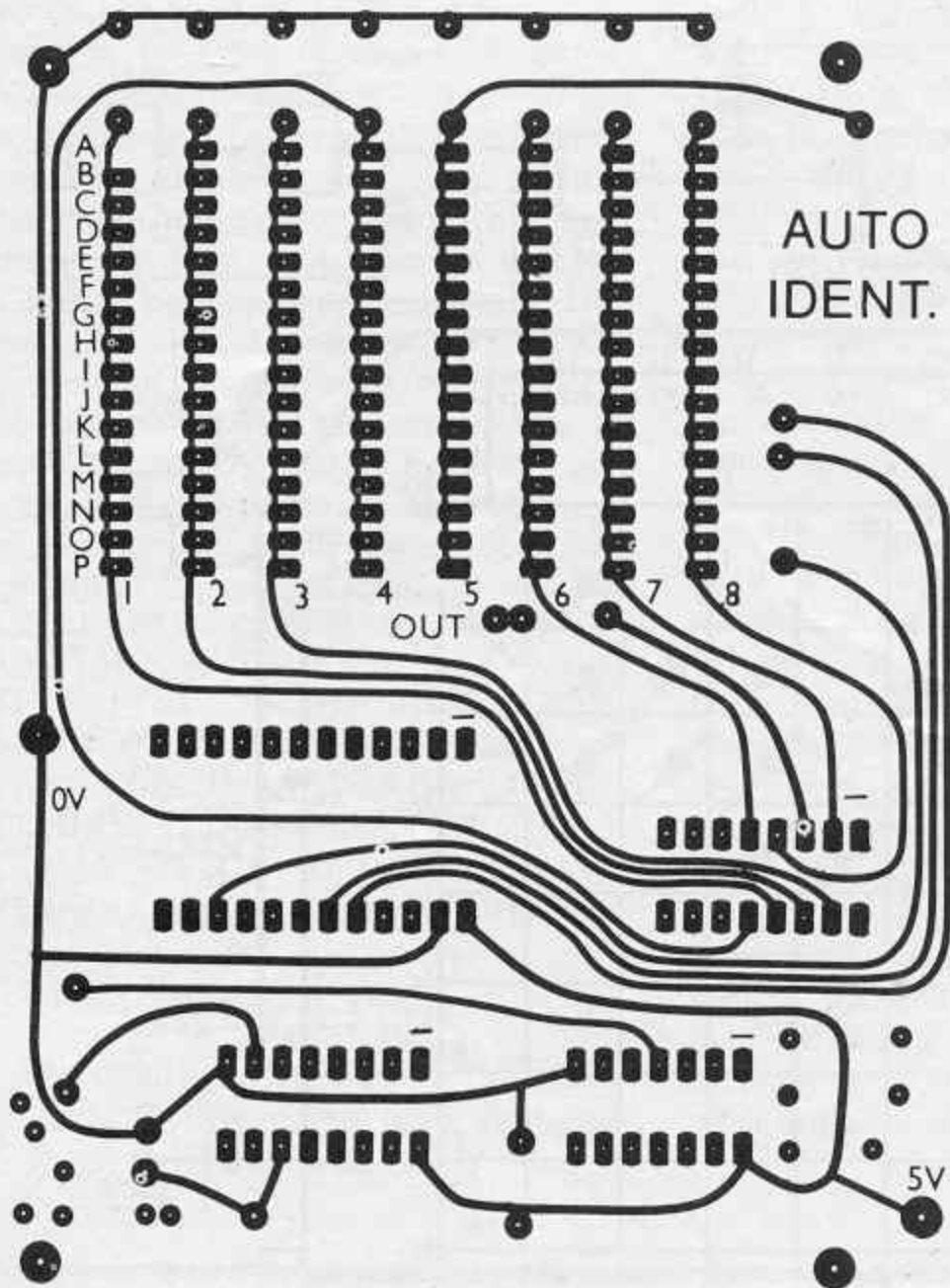


Fig.4. PCB Component Side (full size).

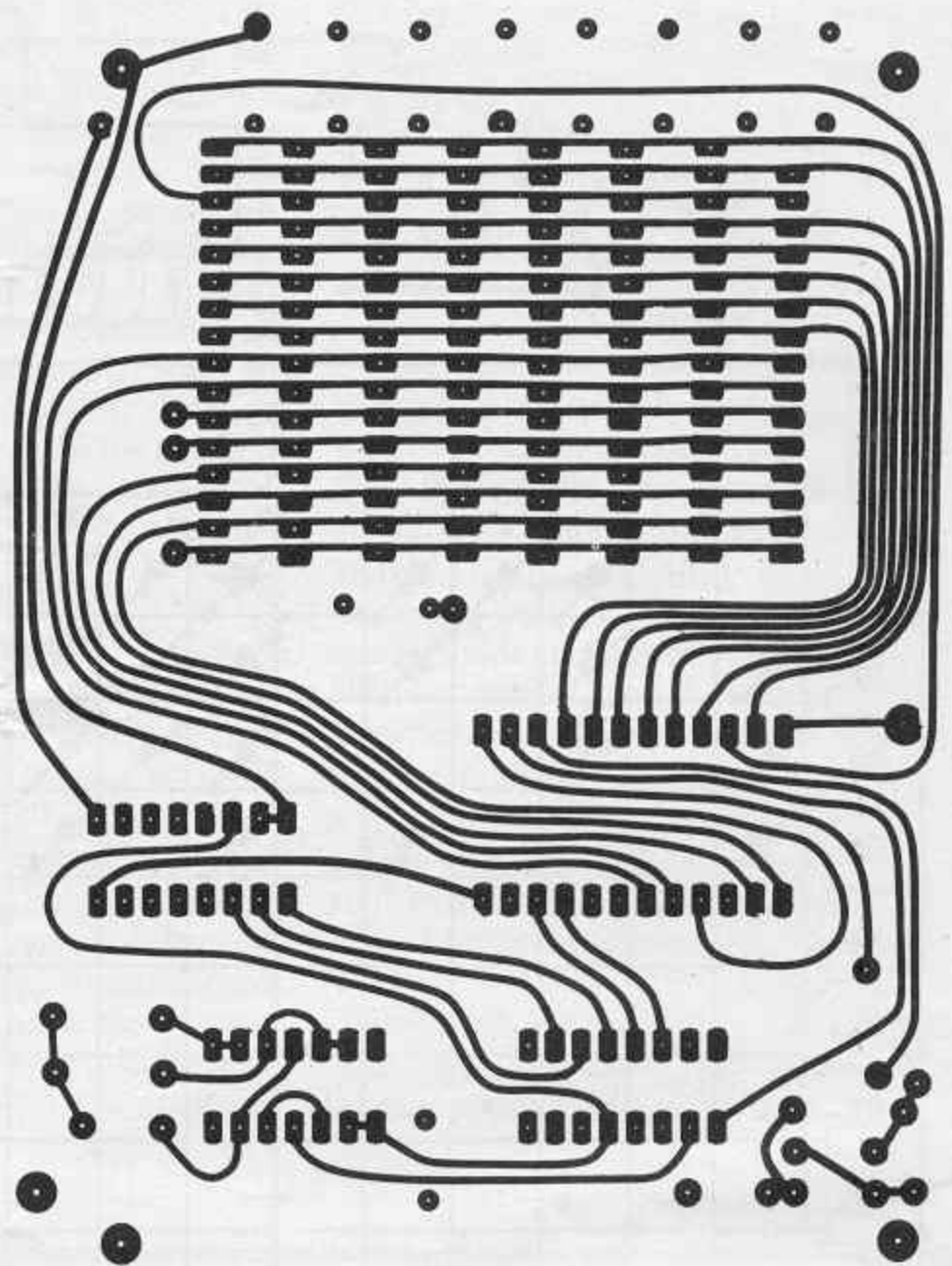


Fig.5. PCB Underside (full size).

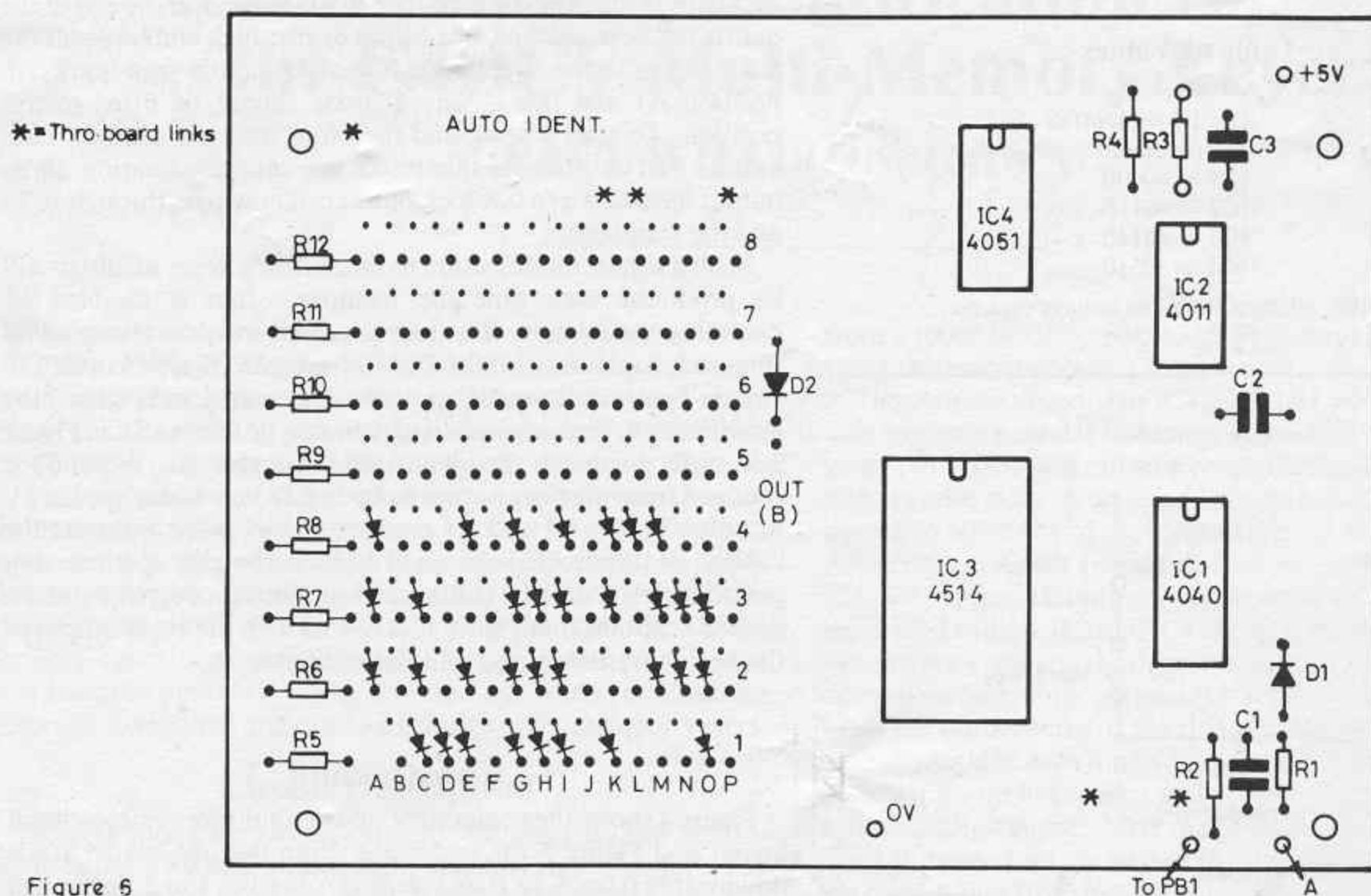


Figure 6

tries never to use IC sockets but realises that many constructors are not happy soldering in the ICs directly. Because the devices need to be soldered both top and bottom only 'Soldercon' or turned-pin sockets should be used.

Printed circuit boards are available from the author for £4.50

each, or a full kit of components including the PCB and 50 diodes (but excluding S3) for £9.80. Please note that the author is *not* QTHR, his address is: P. E. Whatton, G4DCV, 36 Jubilee Road, Littlebourne, Canterbury CT3 1TP. Please enclose 50p post and packing with kit orders.

The Monster Quad

RON STONE, GW3YDX

INSPIRATION for the Monster Quad at GW3YDX was derived from previous use of a triband quad some years ago, and from studies on the Quagi (Quad-Yagi) combination design carried out by G4WXO and others.

After a move to a new QTH a large fixed tower was acquired. During its first year it was used to support 1.8 MHz antennas at about 120 feet above ground level. Results were good, as expected, and once the 160m. WAS was completed (KL7 was the most difficult) the interest and challenge of 160m. dimmed somewhat. Over 200 countries had been worked and new ones were few and far between.

The author has been interested in 40 metres since a licence was first taken out in 1969. The band is a fascinating DX band with classic openings like the W6/W7 long path opening at about 3 p.m. on winter afternoons. The big tower now presented itself as a support for a good 40m. beam at a reasonable height. The tower was accordingly modified for installation of a 40m. beam, with the rotator at 95 feet, and a short stub mast above that. (Working on big antennas above 100 feet is *not* an appealing prospect. Anybody doing work up at those heights *must* wear proper safety belt, boots and a good hard hat. There is no second chance!)

The use of a commercial 3-element Yagi was considered — but not for long. The price was excessive at over £500. In addition it meant that stacking was required to achieve multi-banding. Due to the 'chicken' factor mentioned in the previous paragraph the decision was taken not to increase risk by stacking aerials way above the ground.

The necessary bits and pieces for a 40 to 10-metre quad were partly to hand, but some fibreglass tubing had to be purchased. Good quality tubing does not come cheap. Only *spun* fibreglass tube should be used. The use of the extruded type of tube is tempting because of its low cost and low weight properties, but for

this application such tubing is structurally unsound. Some extruded tube was, regrettably, bought for the first ten feet of each spreader. This penny-wise policy led to the demise of the entire multiband reflector frame eventually.

The difference between extruded and spun tube is easy to spot. Extruded tube is usually light grey in colour and lightweight. Close examination of the surface shows up the individual strands of glass fibre, and it looks rather like compressed Shredded Wheat. Spun tube, on the other hand, is very smooth, with no signs of the individual fibres. It looks as if it has been polished, and is generally creamy-white. *Sandpiper Communications*, Llwydcoed, near Aberdare, South Wales, sell good quality material at a reasonable price and are highly recommended. Unfortunately the postal system can only cope with a maximum parcel length of 1.5 metres, so collection of longer lengths is needed. *Sandpiper* are quite happy to bring customers orders to mobile rallies for collection by arrangement, and they participate in most of the major events. Incidentally, the author has no business connection with the firm!

It was decided to include the other main HF bands, placing the elements in the usual concentric manner. However previous experiments, and studies by other amateurs, had shown that 3 and 4-element quads seemed not to work as well as a 2-element quad with Yagi-type directors. For some reason there seems better coupling with Yagi directors and the radiation pattern seems much improved as a result.

The final design brief was for a 2-element quad on 7 MHz, 3-element quad Yagi (2 quad elements, one Yagi director) on 14 and 21 MHz, and a 4-element quad-Yagi (3 quad elements, one Yagi director) on 28 MHz. All the elements were to be spaced as optimally as possible and they would be arranged in the diamond rather than the square formation. Quad experts generally agree that there is a little more gain that way (greater stacking distance between the current maxima) and this design lends itself to the diamond configuration in any case.

Figure 1 shows the plan for placing the elements on the boom. The reader will note that the optimum spacing (30 feet) for 7 MHz, and for 14 MHz (13 + 14 feet) has been achieved. The 21 MHz spacings are a little compromised, but not by very much. On 28 MHz there is a return to optimum (6 + 6 + 7 feet). This is all achieved by bowing the fibreglass spreaders outwards with the

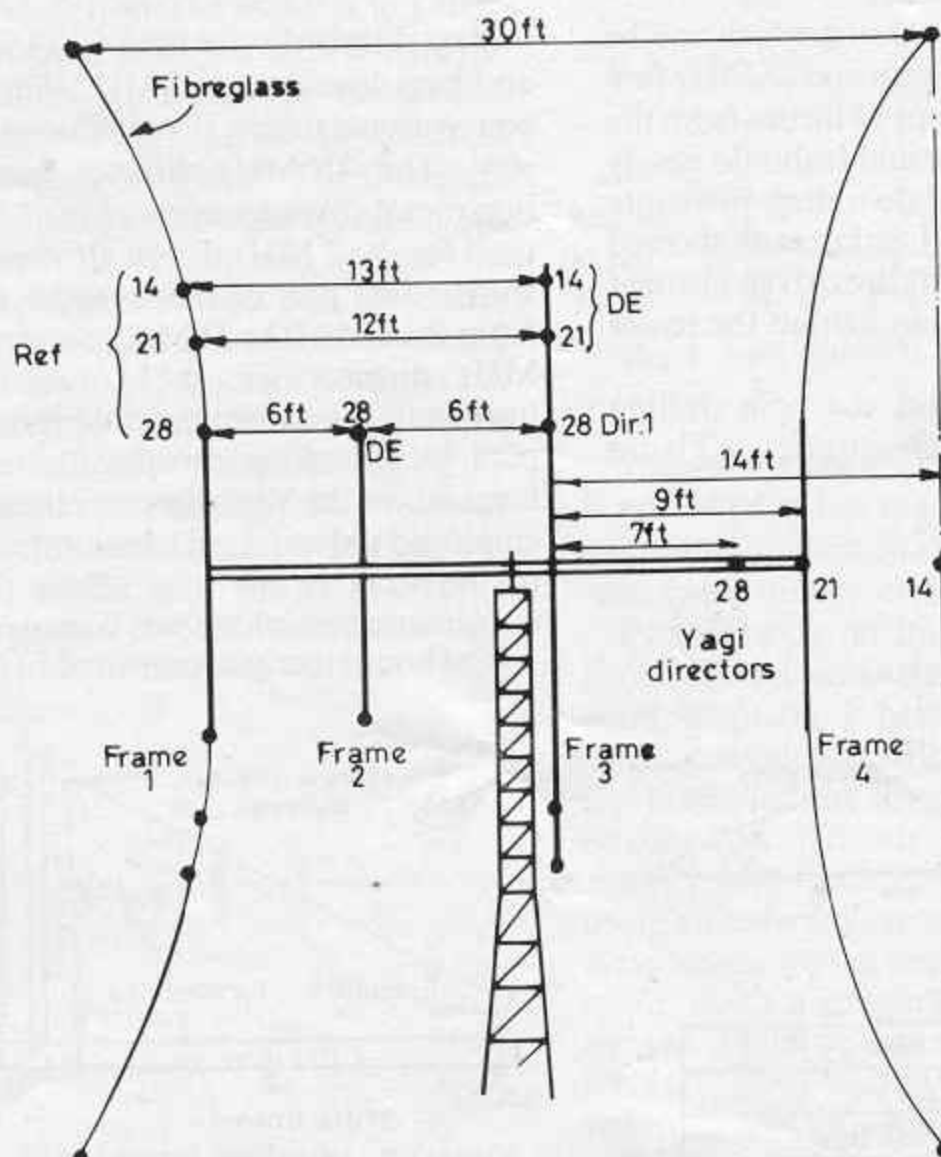
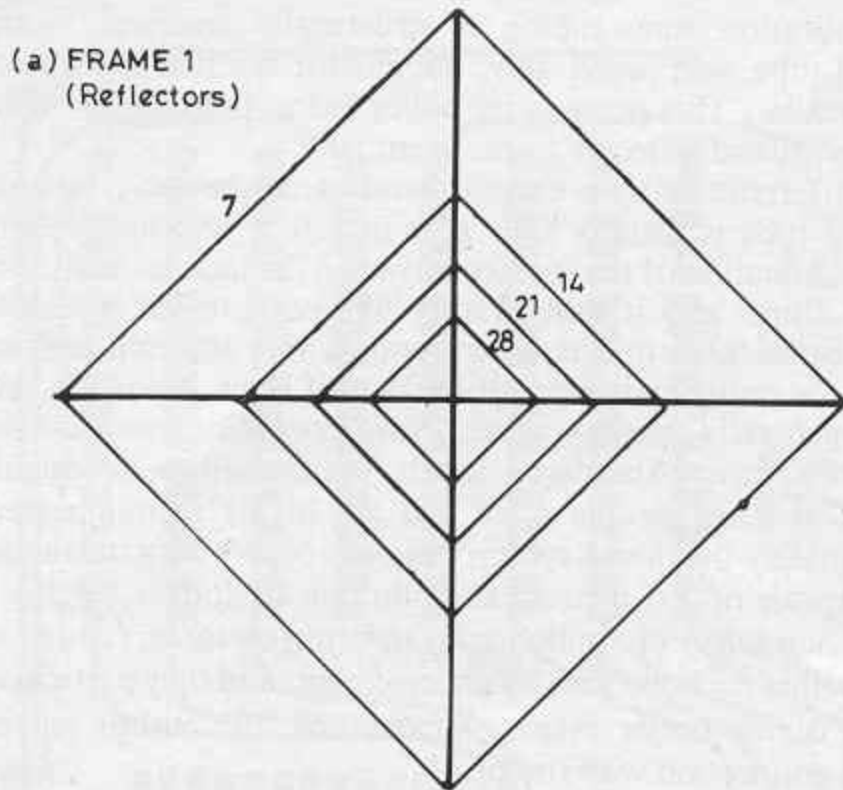
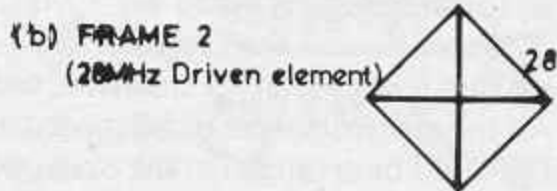


Fig. 1 "MONSTER QUAD" Placing of Elements on 20 foot boom

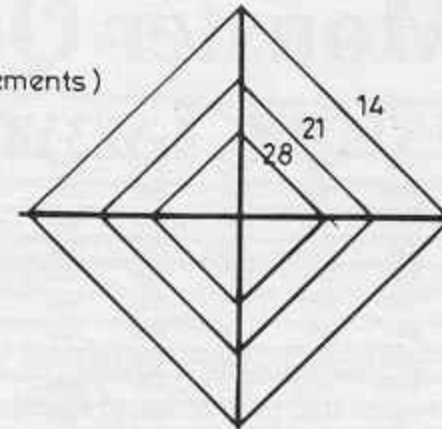


MHz	Total wire length	Per side length	Drilling dims.
7	146' 0"	36' 6"	25' 10"
14	73' 2"	18' 4"	12' 9"
21	48' 8"	12' 2"	8' 8"
28	36' 6"	9' 1"	6' 5"



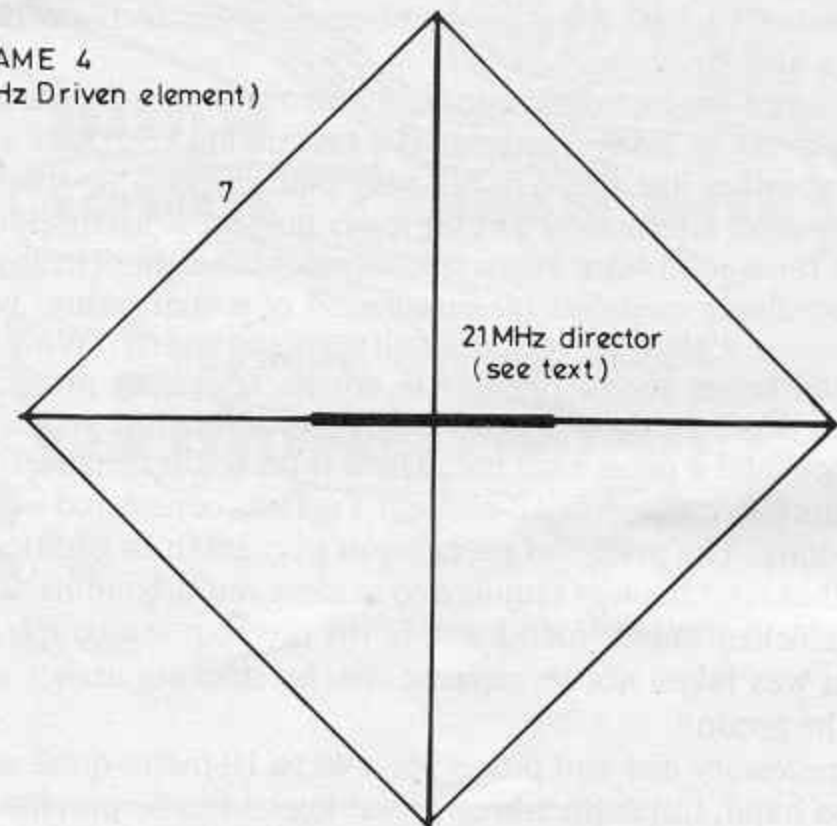
MHz	Total wire length	Per side length	Drilling dims.
28	35' 4"	8' 10"	6' 3"

(c) FRAME 3
(14/21MHz Driven elements)
28MHz Director 1



MHz	Total wire length	Per side length	Drilling dims.
14	70' 2"	17' 7"	12' 6"
21	47' 0"	11' 9"	8' 4"
28	34' 4"	8' 7"	6' 1"

(d) FRAME 4
(7MHz Driven element)

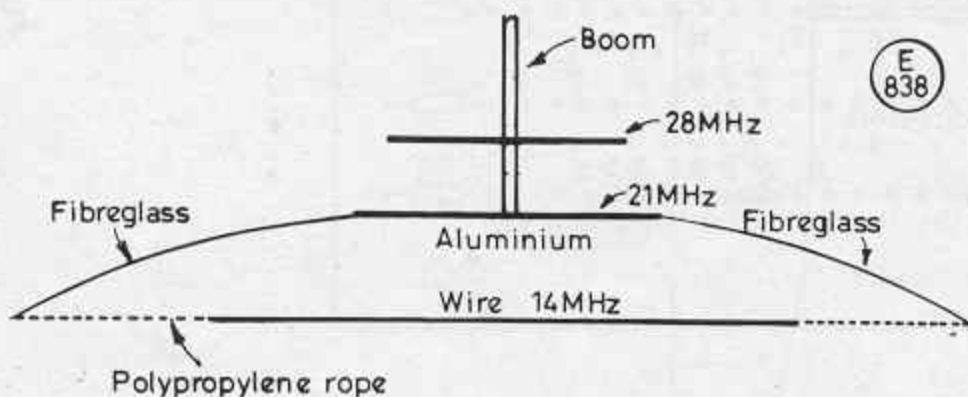


MHz	Total wire length	Per side length	Drilling dims.
7	141' 6"	35' 4"	25' 1"

Fig.2 ELEMENT LENGTHS

40-metre element wires, and by additional bracing which will be discussed below. The 14/21 MHz driven element and 28 MHz first director are mounted on frame 3 which is kept 12 inches from the lattice tower. Physical balance would argue that it should nearly be touching, but tests showed that element de-tuning was quite severe nearer to the structure of the tower. Further tests showed that the optimum results were achieved with the driven element frame towards the Yagi directors rather than behind the tower nearer to the reflector elements.

Dimensions for the element lengths and the pole drilling dimensions from the centre of the quad spiders are given in Figure 2.



Lengths:

14	31' 6"	14 swg hard drawn copper wire
21	21' 2"	1 1/2" dia aluminium alloy tube
28	15' 4"	Alloy tube 1" at centre, 3/4" at tips

Yagi directors were used on 14/21 MHz and a mixture of quad and Yagi directors on 28 MHz. The 28 MHz second director uses a conventional tubing element mounted on the boom in the normal way. The 21 MHz director was composed of the opposite horizontal spreader arms of the 7 MHz element frame (frame 4) used for the 7 MHz driven element. Aluminium tubing was used for the first part of the spreader assembly, with fibreglass used from the end of the 21 MHz element length out to the tips. The 14 MHz director was a 14 swg copper wire element strung horizontally between the outermost tips of frame 4. Figure 3 is a plan view looking downwards (or upwards if you don't like heights!) of the Yagi director placements. The unusual technique employed did not seem to compromise the electrical performance of the array in any way. Once the design was completed the implementation phase was commenced.

The boom material consisted of 3" diameter alloy tube with 14

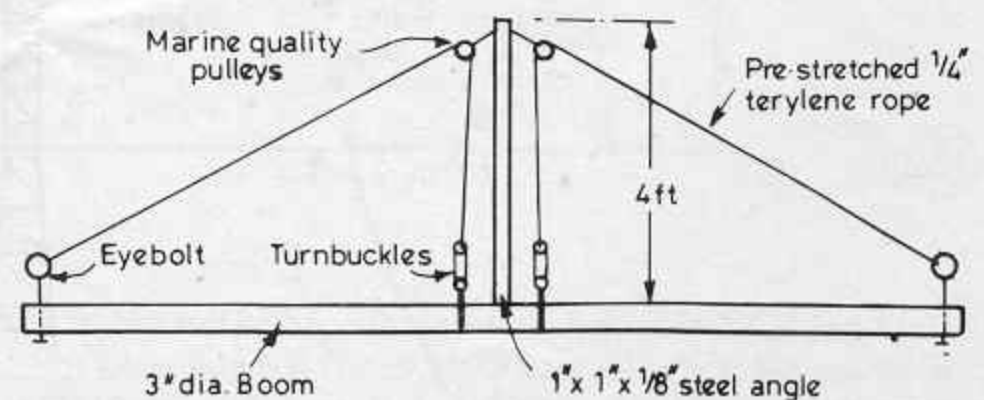


Fig. 4 Boom stay

Fig. 3 Plan view of Directors

E 837

E 838

E 839

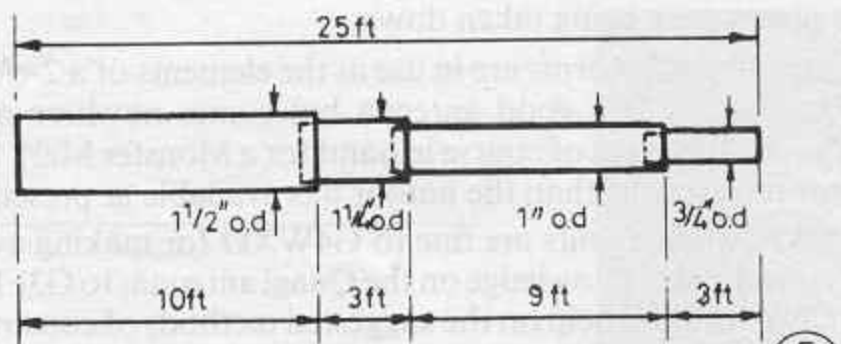


Fig. 5 Fibreglass tube used for 40m spreader

E 840

swg wall. Once the elements were mounted considerable deflection occurred. This is not surprising as the multiband reflector frame and elements together weigh about 60 lbs. As a result the staying arrangement shown in Figure 4 was installed. It was decided to run the terylene rope through pulleys and to turnbuckles mounted close to the boom so that adjustment of the rope tension did not require the author to stand on top of the rotator unit 100 feet above ground to tighten it all up!

With the exception of the aluminium component used to make up the 21 MHz director on frame 4, the quad spreaders used fibreglass throughout; 1/8" wall tubing was used, so that 1 1/2", 1 1/4", 1" and 3/4" outside diameter tubes would telescope together. For illustration one of the frame 1 spreaders is shown in Figure 5. The tubing sections are held together by self-tapping screws, with hose clamps fitted to each tube end to prevent splitting. The 14/21 MHz driven element is made up of 1" and 3/4" tube, and the 28 MHz driven element frame out of 3/4" tube and 1/2" fibreglass rod. All the fibreglass materials can be obtained from Messrs. Sandpiper.

The spiders to support the quad arms to the boom are constructed from 2" x 2" x 1/4" alloy angle for frames 1 and 4, and 1" x 1" x 1/8" alloy angle for frames 1 and 3; all spiders are connected to the boom with 3" exhaust clamps. The author was lucky to have acquired a dozen such clamps from the U.S.A. a few years ago; in this country commercial vehicle parts dealers would probably be a good source.

Discussion with other 40m. quad builders indicated that the main problem with wind survival was breakage of wires at the end of the spreaders. Stranded wire is a 'must', and the author believes that keeping the wires under constant tension helps to prevent excessive flexing which would result from the use of a less rigid structure. In addition, a novel method was used to terminate the element wires on the 40m. spreaders. Each element was divided into four equal lengths (35'4" driven element, 36'6" reflector) and a 1/2" diameter loop formed in the wire ends. The fibreglass pole ends were fitted with a 1/2" diameter hose clamp, and a 1/4" diameter hole drilled through both hoseclamp and spreader to accept a 1 1/2" long, 1/4" diameter stainless steel bolt. The wire loops were attached to the bolt under tension and fitted over a small spacer, about 1/4" long, with a 1/4" internal diameter. A stainless steel retaining nut is fitted to secure the assembly. The element ends are then free to move slightly around the axis of the bolt, whilst good electrical contact is maintained by the tension of the wires on the frame structure. Figure 6 illustrates this further. To add to mechanical stability of the large frames, tip-to-tip diagonal bracing with light polypropylene cord was also used.

The entire quad took a whole week to assemble, working all day

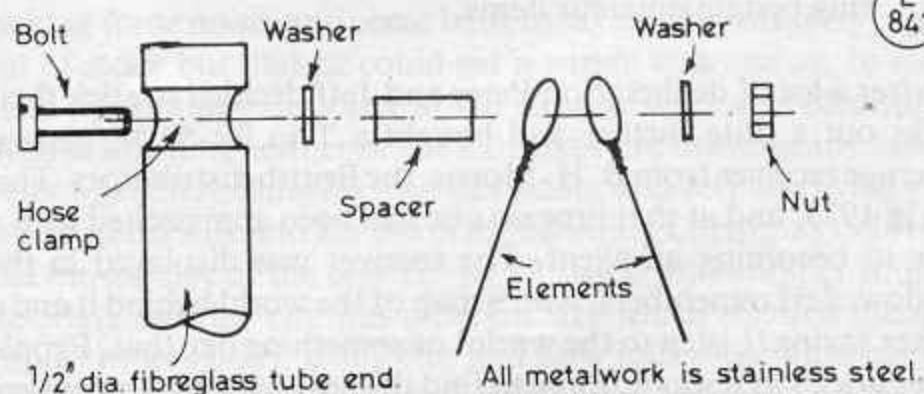


Fig. 6 Element bearing detail. 7MHz elements

E 841

on the project. Another day was needed to pull it all up the tower with a heavy duty block and tackle. The work was done by clamping the boom, together with Frames 2 and 3, to the tower at about the 30 foot level. The 40m. frames were assembled flat on the ground and then hauled into position via a pulley at about 60 feet up.

Quads and fixed towers do not mix. The author must have climbed up and down the tower at least a hundred times during the assembly process, while the XYL, lumbered with the baby, fretted unhappily in the background. All assembly work on a project of this scale really needs to be done at ground level on a crank-up, tilt-over tower unless one has unlimited time and effort to spare.

Eventually the project was completed. One length of Heliac ran to the top of the tower to terminate in a relay switching box and thence via short lengths of URM76 (1/4" stranded centre conductor cable to each element on 14/21/28 MHz). On 7 MHz the driven element was fed via one electrical quarter wave of 75-ohm cable to give a better match. Both the 50 and 75-ohm cables have a stranded centre conductor so that breakages are less likely to occur.

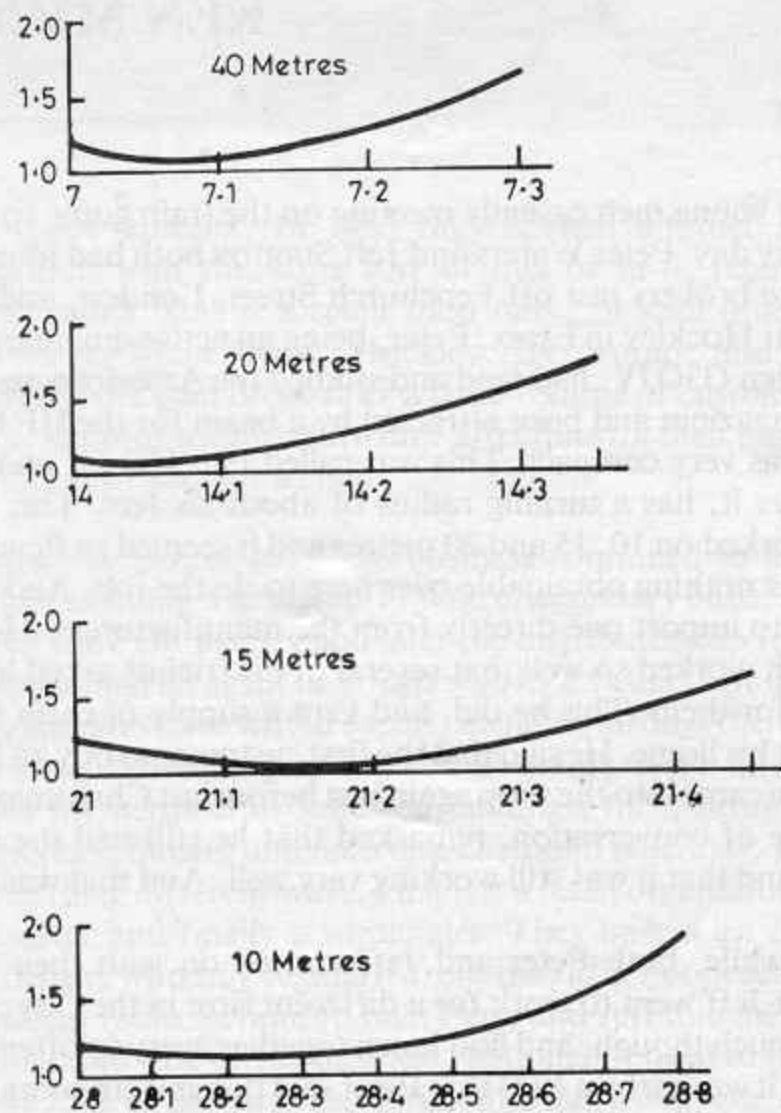


Fig. 7 SWR CURVES

E 842

Total system line loss from transmitter to feed point on 29 MHz is estimated at less than 2dB, which isn't bad considering the 90 metre run of cable to the shack; SWR curves as measured with a reasonable quality meter are shown in Figure 7.

Performance on the air was nothing short of phenomenal. Front-to-back ratio on medium distance stations varied from a good 25dB on 7 MHz to over 40dB on 28 MHz. Forward calculated gain is 6.5dB on 7 MHz and 8.5dB on 28 MHz. Due to the height of the array a good low vertical launch angle was obtained on all bands.

On 7 MHz comparative tests were made over a long period using an inverted-vee dipole at 65 feet as a reference aerial, The quad was always at least two S-units better, and on the long path to ZL up to a staggering 7 S-units better on both transmit and receive. Much advantage was derived from the good front-to-back and front-to-side ratios. The dreaded *Radio Tirana* could be reduced from S9 + 40dB on the S-metre of the author's TS-930S to S7, opening up a very different 40m. band. On 14, 21 and 28 MHz very good reports were received, signals generally being at

least 1½ S-units up on the reference 3-element tribander at 65 feet.

Alas, all good things have to come to an end. At the beginning of September 1986, the tail-end of Hurricane Charlie hit the U.K., bringing with it high winds and lashing rain. The Monster stood valiantly against it for two days, but one morning two of the big reflector spreaders had split at the base, and the beast was no more. The purchase of extruded fibreglass had saved a few pounds and thrown away many days of effort. Unfortunately, no photos of the Monster exist apart from one that the XYL took after the quad had been knocked around in the wind, and while

the pieces were being taken down.

Now fibreglass arms are in use as the elements of a 2-element 7 MHz Yagi. It is a good antenna but comes nowhere near the Monster. Plans are of course in hand for a Monster Mark 2, but it needs more effort than the author has available at present.

Acknowledgements are due to G4WXO for making available his considerable knowledge on the Quagi antenna, to G3FPQ and G4CNY for their help on the suggested methods of construction, to the VK/ZL 7 MHz gang for lots of patience through hundreds of tests. Most of all though, thanks to my wife Janet for putting up with the latest nutty project and for helping when required.

Waters and Stanton Electronics

a gamble that came off

KEN MICHAELSON, G3RDG

TWO young men casually meeting on the train going to work every day. Peter Waters and Jeff Stanton both had jobs at an insurance brokers just off Fenchurch Street, London, and both lived near Hockley in Essex. Peter, being an active amateur, with the callsign G3OJV, had read and studied the American amateur radio magazines and been attracted by a beam for the HF bands which was very compact. This was called the 'HQ-1', and, as I remember it, has a turning radius of about six feet. This small beam worked on 10, 15 and 20 metres and it seemed to Peter that there was nothing obtainable over here to do the job. And so he decided to import one directly from the manufacturers. He tells me that it worked so well that several of his friends asked him to get one for them. This he did, and kept a supply of them in the garage at his home. He said that the first customer to buy an HQ-1 from him came into the shop again just before last Christmas, and in course of conversation, remarked that he still had the beam erected and that it was still working very well. And that was from 1972!

Meanwhile, both Peter and Jeff carried on with their jobs, although Jeff went to work for a different firm in the City. They kept in touch though, and had lunch together every so often. Jeff said that it was early in 1973 that Peter said things were going quite well from his home (part-time of course), and there was a small shop available in Hockley. How did Jeff feel about going into partnership to sell hi-fi, records and also a certain amount of amateur radio equipment? Jeff well remembers sitting in the buffet at Liverpool Street station trying to decide what hi-fi equipment they should buy with their capital of £1000. They made their choice and actually opened the shop on 23rd July, 1973. They sold a few batteries and assorted electrical oddments amounting to some £7.00 in the shop on that first day, and a hi-fi amplifier by mail order, which gave them a total of just over £160.00 Jeff showed me the actual notebook into which they recorded their sales for the first few months. He said he keeps it as an interesting memento.

Obviously as things got moving some sort of facility from a bank was required, and they went to the two banks in Hockley. One wasn't the least interested but the other bank was quite agreeable and allowed them an overdraft of some £3000. The bank, however, required the deeds of *both* their houses as collateral. Quite incredible for such a relatively small amount! The first amplifier they sold from the shop was installed by them on the Saturday evening of the week it was sold, and they joked to the buyer that never had such service been given — both partners

giving personal service from about six o'clock till eleven at night! There are always a certain number of people who will go into a brand new shop to see what is going on, and maybe buy something, and both Peter and Jeff blessed the ones who did!

The organisation is still a partnership as opposed to a 'limited company' and the proprietors like it that way. When the shop first commenced operating, Jeff, who had given up his job in London, was in charge. It was agreed that since Peter had a family, it was better that he keep his job. In fact, Jeff's wife also had a job at a London bank, and because of this Jeff was able to manage the shop full time. There were many heartsearchings during this initial period: money had been spent on stock and they had the responsibility of the shop lease — *and* the deeds of both the partners' houses had been deposited in the bank with no guarantee of any returns. The mail order side continued running in a satisfactory manner which was some help. The first series of advertisements appeared in *Short Wave Magazine*, and Jeff used to parcel up the goods during the morning, rush out to the Post Office at lunch time to despatch the parcels and rush back again to the shop. He says that, looking back, it hardly seems believable! There was a discount house operating at that time near Wickford, and on a number of occasions Jeff would receive a mail order for a certain receiver or amplifier, rush out at lunch time to the discount house, buy the item and come back to the shop, add £5.00 to the cost and send it off to the purchaser. It had to be done, he said, because a customer must be satisfied. Of course, this led to the first time customers returning when they wanted something else, which was the object of the exercise.

For quite some months after the shop opened, the only things that were stocked were hi-fi units, records, antennas and a few associated items. It was not until customers, coming into the shop to buy a hi-fi unit or record and asking why *Waters and Stanton* did not sell amateur radio equipment, that any thought was given to stocking certain amateur items.

After a lot of deliberation Peter and Jeff decided to stick their necks out a little further and bought a Trio 9R-59DE general coverage receiver from B. H. Morris, the British distributors. This was in 1973, and at that time no one had been approached with a view to becoming an agent. The receiver was displayed in the window, Jeff remembers, with a map of the world behind it and a sticker saying 'Listen to the world' or something like that. People were curious as it was unusual to find this sort of exhibit anywhere outside a large town. It wasn't long before the receiver was sold,

The two partners of Waters & Stanton Electronics: Left, Peter Waters, G3OJV, and Jeff Stanton, G6XYU, with transport appropriate for their rural location.



but it was not until about a year later that they first stocked a transceiver. This time it was the Trio TS-515, and Jeff recalls that when they went to B.H. Morris to get it, they were asked how many they wanted, so they bought one! This was early in 1974, and they were then stocking all the peripherals such as Microwave Modules and Solid State Modules. But they had a problem getting hold of Yaesu, Trio and Icom. This seems to happen to all new businesses; the supplier wants to know what the firm has been doing before this, and if one says that one is just beginning, then the supplier just does not want to know. It's really a case of which comes first, the chicken or the egg. It isn't new: I myself had this trouble way back in 1946 when I wanted to acquire agencies for the then well-known brands of radio, such as Alba, Ultra and H.M.V. "Just started?" they asked, "sorry come back in a couple of years."

Fortunately some suppliers were agreeable to letting the firm have goods, albeit on 'proforma' invoice, and with these units the business gradually grew. Jeff remembers their first attendance at a rally. the Maidstone rally he thought, and they started off badly by getting there late. They were exhibiting the HQ-1 compact beam antenna, and at the end of the day they had sold a few things including the HQ-1. A few dealers came up to them and said "Well, who are you and where have you popped up from?" They wished Peter and Jeff luck with their tongue in their cheek, Jeff thought! In due course they packed up and went back home. On the way they stopped at a pub, and Jeff reckons they must have spent their profits in the few drinks that they had. They make a practise of attending most rallies but confess that the takings usually only cover the expenses. It keeps their name before the public says Peter, and that really is the point.

There were times when a customer would ask if such-and-such was in stock and Jeff used to ask them to wait a moment, go outside to the backyard. He would move a few boxes about, making some noise, and come back to say that he was sorry, it was out of stock but that he could get it within a day or so. In fact, there was nothing out there at all, all their stock was on display! Even at this time neither of the partners were drawing any salary. Peter was still holding his job in London, and Jeff was living with the aid of his wife and her job in the bank. By Christmas 1974 they had moved out of the tiny 12' by 12' shop into another shop in Hockley, but this one was a decent size which allowed them to display more goods, and Peter had now joined the business full time. They remained here until 1979, when they moved to their present premises. These are considerably larger and give them

office space upstairs. In 1983 they opened another shop in Hornchurch with the same sort of mix of hi-fi, records and amateur radio. This is a retail shop only, all mail order being addressed to Main Road, Hockley. By prompt and careful attention to the mail order sales a large volume of customers was built up, many of whom return time after time for their purchases, information or just for a chat.

During the period 1979-86 business continued to improve, and while stocking Yaesu and Trio on a secondary basis, the firm acquired the FDK agency and later the distributorship for Welz. They appointed an agent in Tokyo who looks after their interests; they themselves have visited Japan, spending 10 days there during which time Jeff said they worked 24 hours every day! Other agencies for peripherals followed, amongst them being Adonis microphones, Sagant antennas and Diamond antennas. The firm works in three different ways. First it is a retail organisation, next an importer and finally a wholesaler. They have a list of about thirty dealers who buy regularly from the firm, not necessarily in the amateur radio section. In fact, Peter and Jeff told me that the amateur radio side of the business, although it used to be of the order of 75% of the turnover during the 'black box' era, has now dropped to about 50%. The commercial side amounts to between 15 and 20%. They have started a new facet of amateur radio in recent months and that is publishing frequency lists. With the popularity of scanning receivers today, it is necessary to know where to listen and the books undoubtedly serve a very useful purpose. Apart from the VHF listings they also publish details covering 2-30 MHz. Peter tells me that the sales of these books take about 5% of their turnover. They have also just commenced supplying R.S. Components with some items from the Welz range, initially power meters, antenna switches and dummy loads which are to be included in the new R.S. catalogue.

Since the start of the venture in 1972 with just Jeff working full time and with the help of a loyal and enthusiastic workforce, the organisation has increased so that there are five full time people plus the two partners working at Hockley, and two full time at the branch in Hornchurch; a very satisfactory position. The turnover has obviously increased. The figure for their first year in 1972 was £34,000 and out of that they each took £147 in profit for the full year! The position now is vastly different, the turnover for 1985/86 being of the order of £850,000. I think that they can both say that for them, "The gamble did come off", and I wish them every success in the future.

An "All-Transistor Valve Type" Transmitter for One-Sixty Metres

or Top Band for a quid

HUGH ALLISON, G3XSE

As always, it started in a pub. A newly licenced (and skint) Class-A amateur was making out how easy it was to cobble together a Top Band rig in the old days. The theme of his argument was that three valves plus power supply and you were there, whereas nowadays you could use three or more transistors in the VFO alone. Warming to his point, he was also saying that, even when you did find an easy design, it invariably used difficult-to-get ferrite cores or some other special device. Well, I had to be the hero who disputed all of this — and who ended up tasked to make a simple three transistor, ten watts input, no funny cores, VFO controlled CW rig?

The Circuit

The VFO was no problem, the circuit shown has proved its reliability over the years and has always produced a clean stable carrier combined with 'sure fire' oscillation. Purists may scream with horror at taking the VFO output from the top of the coil, but the lower voltage output at the emitter, where it 'should' be taken from, would require an extra transistor, so that was right out! In practice there is about a hundred hertz frequency change between key up and key down, but the transition is so quick that there is negligible chirp and netting is close enough. Since the design was to be such that it could mainly be knocked together from old rubbish in the average shack, TR1 is moderately uncritical, any NPN device that will whizz at 2.5 MHz or more will probably do — BC107, 108 or 109, 2N2369 or even the medium wave oscillator transistor out of your average Japanese radio. For good stability I would seriously recommend that C1 and C2 be reasonable quality silver mica types, though they may be of differing value ($\pm 50\%$) of the nominal values shown. IF you don't mind a tiny bit of chirp you can leave out the zeners.

The output of the VFO goes into TR2, which is trying all out for voltage gain. Here, too, the transistor type is fairly uncritical, BLY33, BFY50 family, 2N3866 etc. You are looking for 500mW + and able to take 30 volts VCE or more. A 2N4427 will not work here (well, not for long) due to the volts swing across it. The transistor doesn't seem to get hot enough to need a heat sink, but it's up to you!

The PA

This is the magic bit. I fell in love with power FETs a few years ago, and really cannot understand why they have not caught on more with the amateur community. They are cheap (about a quid) and virtually unbustable — what more do you want? About the only way to pop a FET is to overvolt it, and I did bust a couple in the prototype stage by stupidly tapping the 'anode' (drain actually) too far down the coil, where the voltage swing caused by the coil ringing was higher than the maximum drain source voltage allowable; hence disaster.

The power FET is driven to distraction by the output of TR2 and switches chunks of current into L3, which is resonant on 160m. and cleans up the waveform a treat. A four-turn coil couples the energy out to the 50-ohm aerial. The output is a good sinewave and clean on a spectrum analyser. Finally, a word of warning. There is, literally, thousands of volts of RF at the top end of L3 (where it joins VC3), and I've got a burn mark on my thumb to prove it, so take care. VC3 can be anything over about 360pF, I used a 500pF postage stamp trimmer (*Radio Spares* type) only because it was to hand, other variants have used ex-domestic radio variables (both halves strapped) with no arcing problems.

Table of Values

Fig. 1

R1 = 1K	C7 = 0.01 μ F any type
R2, R6 = 47K	VC1 = 100pF air-spaced variable cap.
R3 = 4K7	VC2 = 500pF 'postage stamp' compression trimmer
R4 = 33K	VC3 = as VC2, or see text for 80m.
R5 = 10K	TR1 = BL107/8/9, 2N2369 etc.
R7 = 22R	TR2 = BFY50, 2N3866, BLY33 etc.
C1 = 27pF silver mica	TR3 = VN66, VN88
C2 = 4.7pF s/mica	ZD1, ZD2 = 5.6V 400mW (plus) zener
C3, C4, C5,	
C6 = 0.1 μ F any type	

Note: all fixed capacitors 12V working or greater; all resistors 1/4-watt or greater.

Coil Data: all coils about 22 s.w.g. on 1" to 1 1/4" dia. former and wound 1/2" up from end of former (see text); 40 turns of 22 s.w.g. should have a winding length of approx. 1". L1 = 40t tapped at 10t from earth; L2 = 40t tapped at 10t from rail; L3 = 40t tapped at 3t from rail, overwinding 4t for 50 ohms at earthy end (a 12V car tail lamp will glow brightly if coupled in with two turns).

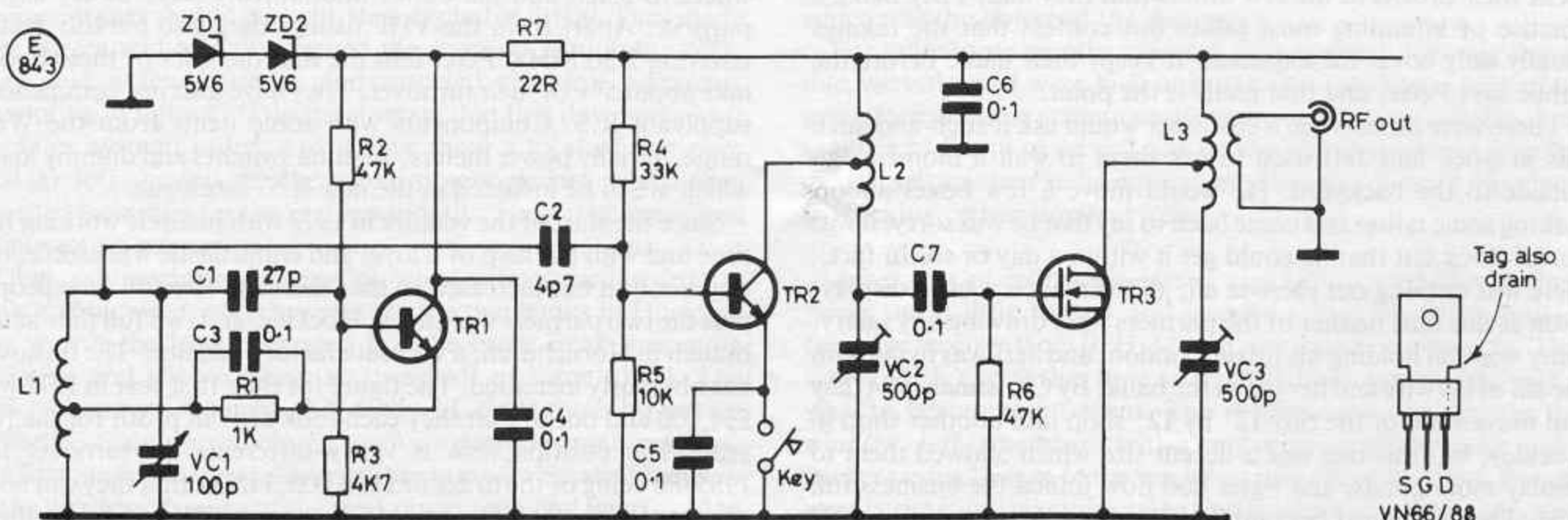


Fig.1 TRANSMITTER CIRCUIT

Construction

The whole point of the exercise was that (with the exception of the power FET) the rig should be easily constructable out of rubbish to hand. Since the rubbish in your hand may not be the same as the rubbish in mine, I shall not give a layout, just some general guidelines.

As a rule of thumb none of the coils should be within two inches of each other, otherwise instability will occur. The coils themselves are wound on a former often found in the smallest room in the house, or a one-inch diameter bit of wooden dowel will work just as well. If you glue them down onto a metal chassis (or copper laminate etc.) have the coils half-an-inch or so up from the chassis to prevent the metalwork acting as a shorted turn. Talking of glue, wax or somesuch over the turns of L1 will help improve long term stability. I built the prototype to my usual standards (badly) on a 4" x 12" chunk of single-sided PCB, unetched, and just soldered things down where they seemed to want to be. Others have been built up neatly in a fancy case and another on a chunk of 4" x 1" thick x 12" long bit of wood, two wires, one each edge (positive and negative) and the bits soldered in between. It's a forgiving circuit!

Power FETs are great when over run, they just back off. Normal transistors take more current as they get hot, which leads to more heat which leads to expense; power FETs don't. However, even I have a conscience, so I chucked a heatsink on mine though, as an experiment, I had a QSO without one. At the start I had about seven watts out, but after a minute at 18 w.p.m. it was down to about four out, so a heatsink is a good idea. (Incidentally 7 watts came back after about three minutes cooling off). Beware, the tag is drain so something needs insulating.

In Use

After an initial teething problem (a wonky signal due to the pounding of the key on the bench disturbing L1, cured by

candlewax as above) reports of T9 were received. The aerial changeover system between transmit and receive is the 'armstrong' method, *i.e.* the 100-metre longwire antenna has a croc. clip on it and you clip it onto L3 for Tx and onto your Rx for receive. ATU's are not allowed in my shack! The flashy box variant referred to above featured an aerial change-over relay which also did the keying. The owner's pansy el-key couldn't take the 60mA keying current, though my real man's brass pounder has no trouble.

Current all-up is about an amp at a nominal twelve volts, and you get about seven watts up the aerial so overall efficiency is quite good. If you want to go to the trouble of another rail the VN66AF will take 60v. across it, but 24 volts will give a hefty 15W out, which is about the limit. VN88AF's and a number of IRF devices have worked well, but since IRF devices are not really RF orientated I wouldn't go out and buy one for this project.

Doubling onto 80m.

Stability of the VFO is such that you can make the rig go on Eighty as well. I used postage stamp trimmers for VC2 and VC3, finding that a ± 50 kHz band width before losing a watt (centred on 1850) was quite an acceptable price to pay for not having to tune up each time. If you care to use a 'proper' variable with a lower minimum capacity than that exhibited by most compression trimmers (*i.e.* the aforementioned *ex-broadcast* radio type) then Eighty will be at one end and One-Sixty at the other, maximum capacity, end. The VFO will obviously have to now go down to 1750 kHz.

Results

T9 every time, and with a humble four-valve Lafayette receiver best DX on 100-metre long wire, not actually tuned against anything in particular, 539 from a DL. Not astounding but not bad for a quid all up. As one amateur said, it's an all-transistor valve-type Tx!

A Quiet Sun Equals LF Bands Fun

use the LUF to work DX on the lower HF bands

A. D. TAYLOR, G8PG

READERS of this journal will be familiar with the fact that during periods of low sunspot activity the MUF drops sharply, the 28 MHz band is rarely open, and bands such as 14 and 21 MHz open for shorter periods. This has led to the supposition that during the years of low solar activity conditions will always be bad and little DX will be worked. The reason for this popular belief is that while most operators have a working knowledge of the effect of changing MUFs on propagation very little attention is paid to the effect of sunspot activity changes on the *Lowest Usable Frequency*, or LUF. This is probably because, unlike the MUF, the LUF involves many more variables, and is likely to vary from location to location. Despite this, however, the LUF at each location does vary with the sunspot cycle, and, unlike the MUF, it

may be possible to lower the LUF at any particular location by making technical improvements.

What is the LUF? How Can We Use It?

The LUF is the *lowest* frequency at which communication can be maintained between any pair of stations. It is affected by current propagation conditions and a number of other factors which will be discussed shortly. Sometimes the difference between the MUF and LUF will be large, as for example when 28, 21 and 14 MHz are all open to the U.S.A. at the same time. Often it will be small, with only one band open to a distant location. Equally often the LUF for a particular path will be *higher* in frequency than the MUF, so communication over that particular path will be impossible.

Let us now consider the factors which will govern the LUF for a particular path at your station or mine. They are as follows: the ionospheric absorption on the path; the transmitter power used; the gain of the transmitting and receiving antennas; the local noise level at the receiving site; the type of emission used. Absorption of HF signals occurs due to collision with particles in the various layers of the ionosphere. Each time such a collision occurs some energy is lost from the transmitted wave. As the frequency is decreased absorption becomes greater, the accepted figure being that halving the frequency increases the absorption four times. What is often not realised, however, is that nature has a built-in compensating factor for periods of low sunspot activity. During such periods the ionisation of the ionosphere decreases considerably, this causing the absorption of lower frequency

signals to drop by up to 50%. This of course lowers the LUF considerably and increases the strength of DX signals on the lower bands. It is thus possible to obtain results on these bands which are not possible during high levels of sunspot activity.

Optimising these results will involve work in both the transmitting and receiving sections of the station. Increasing the effective power transmitted over the path by 10dB will decrease the LUF by about 2 MHz, possibly opening up an additional band for DX working. While such an increase may sometimes be obtained by a brute-force method such as a bigger linear amplifier, the cost-effectiveness (and possibly ethics!) of such an approach are questionable. Before power is increased the antenna system should be carefully examined and everything possible done to increase its radiating efficiency. With horizontal antennas at low frequencies increasing height is a sure way to improve results. If such an antenna is less than half a wavelength long careful attention should also be paid to the method of loading it (end-loading is almost always the best for efficiency) and to the earth and/or counterpoise system. In some installations these points alone may produce an 8 or 10dB improvement!

Where height and/or length are a problem the possibility of using a vertical antenna is well worth thorough investigation. For many years there has been a legend in both amateur and professional circles that good low angle radiation from IF band verticals requires a height of a quarter-wave and a system of 120 quarter-wave buried radials. Recent published work has brought this approach (which was based on work carried out half a century ago) very much into question. Firstly, the research of the American amateurs, Doty, Frey and Mills, shows that a far smaller system of *elevated* radials will provide equivalent results, even with a short vertical antenna. The proof is WAC on 1.8 MHz using a 30 foot loaded vertical over 36 elevated radials occupying a space 100 feet square. Scaled for 7 MHz this equates to a 7½ foot high vertical over a 25 foot square counterpoise! Their paper (1) should be required reading for all IF band enthusiasts (and professional broadcast station engineers!). A second approach, propounded by Moxon (2) is the use of the asymmetrical dipole, in which the other half of the dipole comprises a single, carefully resonated counterpoise. By using wire top loading on the radiating section it should be possible to get good efficiency even in a fairly small garden. There is already one 3.5-28 MHz variant commercially available.

When we come to signal-to-noise ratio at the receiver and the mode used, once again there is much that can be done to improve results on the IF bands. Here the first thing to realise is that it is the *readability* of the signal that makes communication possible, not its strength. A 5-and-3 signal is 100% readable but a 2-and-7 signal is not. As both natural and man-made noise increase at the lower frequencies, DX work often involves using the absolute minimum of bandwidth to obtain the best signal-to-noise ratio. Although it may be unpopular in some circles, the fact remains that in this respect CW morse transmission, using very narrowband filters, is considerably superior to SSB, and will often allow communication when the latter mode does not. To achieve this the minimum possible bandwidth is essential, and this means that CW type crystal filters in the IF chain *must* be backed up by good audio filters. The latter can usually be fitted externally at the output of the receiver.

Experience at G8PG in a fairly noisy location has shown that ideally three types of filter should be available, with provision to switch them in or out of circuit as required. The three filters used are a 1 kHz, LC, lowpass, a 750 Hz, LC bandpass (80 Hz), and a 750 Hz, 4-stage active, bandpass (80 Hz). The 1 kHz bandpass filter is normally left in circuit. It cuts down both the bandwidth and residual AF amplifier noise. For normal high selectivity operation the active filter is used, but in the presence of high local impulse noise its performance is not as good as that of the LC bandpass filter, even though the attenuation of the latter is a little higher, so under these conditions using the LC filter often allows a signal to be read much more easily.

There seems to have been little serious research into applying similar external filtering to improve the audibility of SSB signals

under conditions of high local noise. During W.W.II the GPO research staff did, however, investigate the most suitable bandwidth for intercom systems in fighting tanks. In this incredibly noisy environment it was found that best intelligibility was obtained when the speech bandwidth was restricted to 500-1500 Hz. It would seem, therefore, that experiments with filters to provide this bandwidth at the output of an SSB transceiver might pay dividends for DX work.

A further method of improving signal-to-noise ratio at the receiver may be the use of a separate receiving antenna. If the main origin of local noise is a single source, use of a loop receiving antenna may allow it to be nulled out so that signals other than those on a line running through the noise source are able to be received with a greatly improved signal-to-noise ratio. Small active antennas are also available commercially, and it may be possible to erect one of these at a point in the receiving site where it picks up minimum noise. And, of course, those who are lucky enough to own a lot of real estate will not need to be reminded of the noise reducing properties of the Beveridge antenna (two wavelengths or more of wire 8 to 10 feet high, pointed at the great circle bearing of the area it is desired to work, and terminated to ground at the far end *via* a 600-ohm carbon resistor; a receiving-only device).

Conclusion

It is hoped that the information above will provide some new ideas for understanding and improving IF band operation during sunspot minimum conditions. Lest the operator who favours the higher HF bands should feel that he has been ignored, the writer hastens to assure him that attenuation on these bands is also decreased by about 25% during quiet sun conditions, and although they open later and close earlier, a few watts of RF will still bring plenty of DX contacts on them. So even though Old Sol is having a rest period it still seems that he is trying to do something for everybody.

References.

- (1) "Efficient Ground Systems Vertical Antennas", *QST*, February 1983, p. 20.
- (2) "HF Antennas For All Locations", published by RSGB.

Home-Made Coil Stock

easily made high-Q coils for transmitting applications

P. C. COLE, G3JFS/DA1PE

ALTHOUGH it is no longer possible to purchase coil stock suitable for use in transmitting applications, such as valve PA tank circuits and aerial tuning units, it is really quite easy to make one's own using readily available materials. The method of construction shown in Fig. 1, and which I first devised about 20 years ago, makes use of strips of 0.1 inch grid matrix board to form spacers and supports onto which a prewound coil is threaded. Mechanical strength is then obtained by securing the turns of the coil to the spacers with *Araldite* or other similar epoxy resin glue.

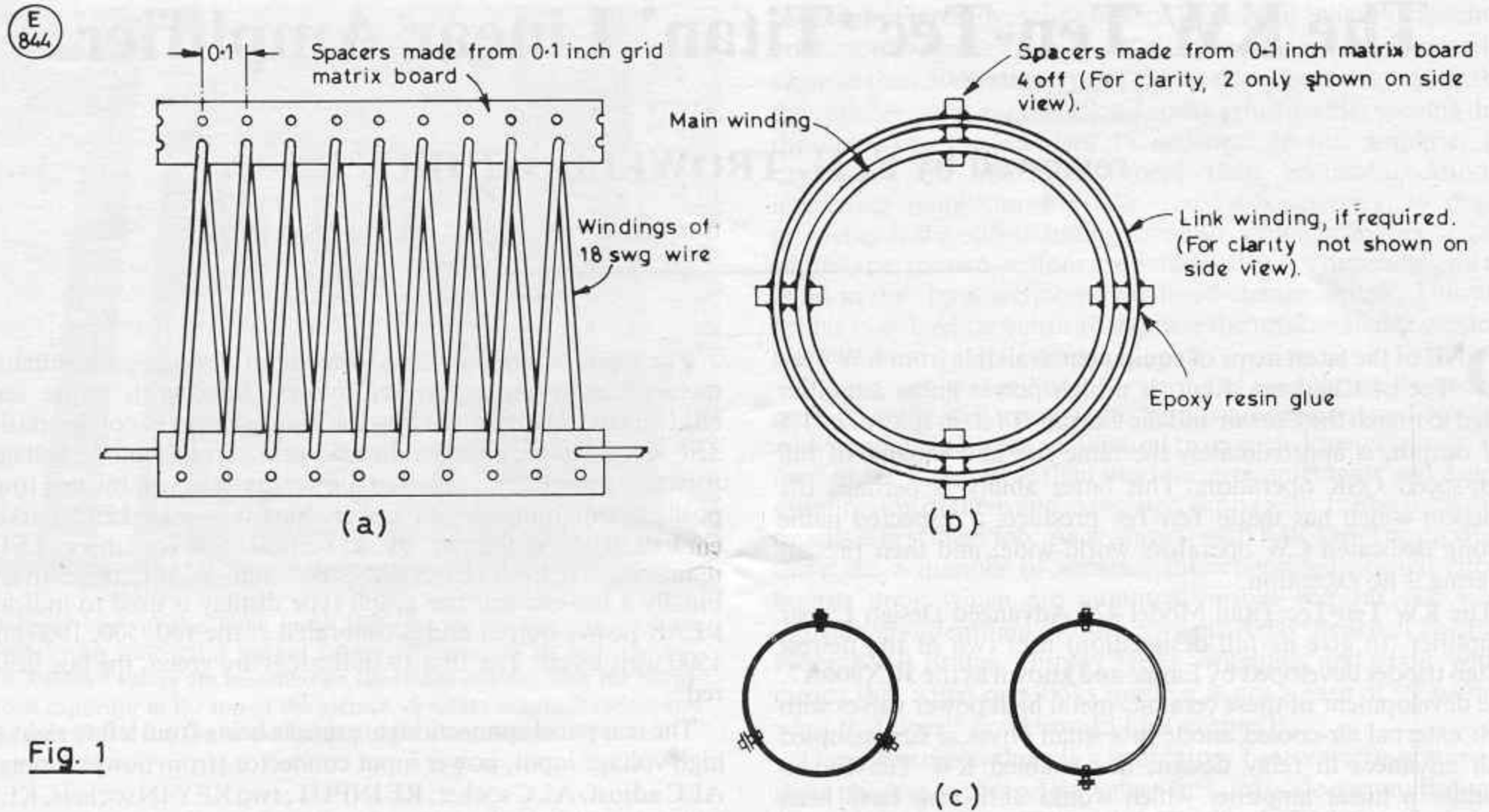


Fig. 1

Fig. 1: (a) side view of the home-made coil stock showing the main constructional details. Turns spacing supports are strips of 0.1" grid matrix board 'araldited' to the windings; the result is a very rigid high-Q coil suitable for transmitting applications. (b) end view showing the positioning of the spacers and how a link winding may be added to the assembly. (c) alternative arrangement of spacers suitable for use with small diameter coils. *Materials required:* 4 strips of 0.1" grid matrix board about 1" longer than desired coil length; 18 s.w.g. tinned or enamelled copper wire (note: tinned copper wire is recommended for tapped coils); quick-setting epoxy resin adhesive.

Hopefully the drawings in Fig. 1 are self-explanatory and there should be no constructional problems if the following procedure is followed:-

1. Prepare the spacers.

(a) Cut strips of matrix board, 2 'holes' wide and about 1 inch longer than the desired finished length of the coil. This requires a lot of care and a steady hand as the material is quite brittle, so that the narrow strips are easily broken. I have found that the best method is to support the board on a carpenter's bench hook and then cut it along a row of holes with either a dovetail saw or a fine-toothed tenon saw.

(b) File the edges of the strips smooth and then slightly roughen the faces to give a good surface for glue to key on to.

2. Prepare the wire

(a) Determine the length of wire needed to make the desired coil. This could be calculated, but the practical way is to wind the required number of turns of string onto a former of the correct diameter, add another 2-3 turns for wastage and cut an 18 s.w.g. copper wire (tinned or enamelled, as appropriate) to the same length as the string.

(b) Straighten the wire to remove kinks and twists. To do this secure one end of the wire to a firm support such as a bench vice and pull the wire firmly over a wooden mandrel such as a length of broom handle or a large diameter dowling. Repeat this several times but take care not to physically stretch the wire as this could affect its electrical properties.

3. Wind the coil

(a) Choose a strong former slightly smaller in diameter than that required for the finished coil. Fasten one end of the wire to this former and then carefully close-wind the wire onto it, keeping the tension firm and as even as possible.

(b) Having wound the required number of turns onto the former gently release the tension. At this point the coil will partly unwind and can then be removed easily from the former.

(c) Handling it very carefully to avoid distorting the winding, thread the coil through the holes in the spacers as shown in Fig. 1.

(d) Position the spacers and glue them to the coil using the minimum amount of quick setting epoxy resin adhesive. This can be a particularly messy operation as epoxy resin has the consistency of treacle, but the danger of getting glue in all the wrong places can be lessened if the spacers are dealt with one at a time instead of trying to do them all at once. Grip one spacer in a vice, arrange the coil turns as neatly as possible, glue, and leave to set. Repeat for the remaining spacers.

(e) Put the coil to one side until the epoxy resin is properly cured. This can, if necessary, be hastened by the application of gentle heat.

(f) If a link winding is needed this may now be wound in the same manner and threaded through the second row of holes as shown in Fig. 1b. The link can be positioned centrally over the main coil for push-pull operation, or at one end for unbalanced operation.

Final comments

This method of construction is suitable for applications where high-Q air-spaced coils capable of handling the maximum legal power are needed. The recommended wire size of 18 s.w.g. is the thickest gauge that will pass through the holes in standard matrix board and this should be heavy enough for most amateur needs, though it would be possible to drill out the holes to take 16 s.w.g. wire. There is also a slight disadvantage in that the winding pitch is limited to a maximum of 10 turns per inch, but in practice this is a pretty good compromise for HF coils as Q-values of 200 are easily obtained whilst values of over 300 can be achieved by optimising coil dimensions (length/diameter ratio).

The KW Ten-Tec 'Titan' Linear Amplifier

reviewed by E. H. TROWELL, G2HKU

ONE of the latest items of equipment available from KW Ten-Tec of Chatham, Kent, is a high power linear amplifier styled to match the Corsair and the Corsair II yet, in spite of its 1.5 kW output, is approximately the same size and capable of full high-speed QSK operation. This latter ability is perhaps the function which has made Ten-Tec products a respected name among dedicated CW operators world-wide, and their present offering is no exception.

The KW Ten-Tec Titan Model 425 Advanced Design Linear Amplifier (to give its full designation) uses two of the newest design triodes developed by Eimac and known as the 3CX800A7. The development of these ceramic/metal high power valves with their external air-cooled anode in a small physical size, coupled with advances in relay design, has enabled KW Ten-Tec to produce a linear amplifier which would until now have been impossible. The bands covered are 1.8-2.0, 3.2-4.7, 6.5-8.5, 13.4-19.6, 17.6-23.0 and 20.6-31.0 MHz.

Externally the amplifier size is 5¼" high x 15¼" wide x 10¼" deep, the weight being 17 lbs. The finish and knobs match the Corsair with the air intake for the squirrel cage fan in the right hand side of the cabinet. The air is blown into the sealed compartment containing the valve bases and escapes through the valve anode fins and out of two ventilation areas in the cabinet top directly above the valves. A stainless steel tilt bail is fitted similar to the Corsair.

Front panel controls are well positioned, the main panel containing on the left the LOAD control (fitted with reduction drive), next to this the four-position meter switch for reading grid current, anode voltage, forward and reflected power on the easily-read meter. The band change switch is next and between this and the TUNE control (also fitted with reduction drive) are three rocker type switches positioned in line above each other. The top one is STANDBY/OPERATE, the middle switch VOLTAGE LOW/HIGH and the lower one POWER ON/OFF.

The top sub-panel contains from the left, two large illuminated meters (unlike most Ten-Tec meters, fitted with centre zero adjustment), the first reading the anode amperes continuously. The second meter is scaled to read grid current, anode voltage, forward power and reflected power as selected by the four-position switch mentioned earlier. Next is a single LED marked OVERDRIVE followed by a vertical row of three LEDs indicating OPERATE, STANDBY and WAIT respectively. Finally a ten-element bar graph type display is used to indicate PEAK power output and is calibrated at the 100, 500, 1000 and 1500 watt levels. The first 19 indicators are green, the last being red.

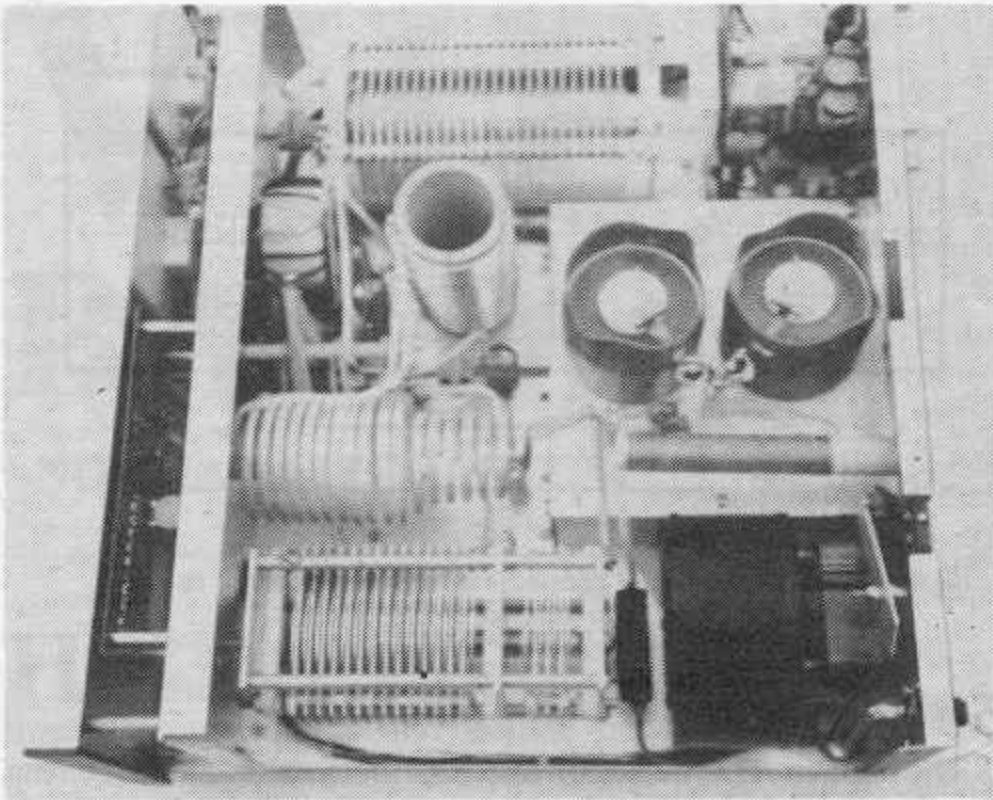
The rear panel connections are simple being from left to right — high voltage input, power input connector (from power supply), ALC adjust, ALC socket, RF INPUT, two KEY IN sockets, KEY OUT, RF OUTPUT and a GROUND (earth) terminal.

Two safety interlocks are fitted which operate if the cabinet is removed or even not fitted properly. One will remove the power and the other, just to make sure, will short circuit the high voltage input. KW Ten-Tec have paid particular attention to safety and warn that potentially lethal voltages both RF and DC *do exist* inside the cabinet.

The power supply is contained in a separate cabinet, size 8¼" high x 13¾" wide x 10¼" deep, weighing 45 lbs. It has no controls as two inter-connecting cables enable operation to be carried out from the front panel controls of the amplifier. These cables are long enough to allow the power supply to be placed on the floor provided that the ventilation holes in the sides are not obstructed. The unit has similar safety interlocks to the main amplifier. One will not allow AC to be applied if the cover is not in place and the other is a rather dramatic "crowbar" type which, in the event of the interlock switch failure, will place a dead short across the high voltage section and discharge the capacitor bank. In this event no damage will occur as protective circuitry is provided. Eight 400µF



General view of the Titan linear amplifier. The export model (described) has an extra band switch position for 10 metres.



Interior view of the Titan linear showing the cooling fan, bottom right, with split-stator output tuning capacitor to its left; the two 3CX800A7 valves are mounted on the raised chassis, with the 500pF load capacitor at the top of the picture. A safety interlock switch can be seen above the fan in the bottom right hand corner.

450v. computer grade electrolytic capacitors with appropriate bleeder and voltage equalization resistors provide 50 μ F of filtering at 3.6 kV.

The transformer is known as a Hipersil core type, being tape wound, rated at 20 amps primary current at 220/250 volts and supplies all the various voltages. Other input voltages are catered for and high and low voltage outputs are obtained by taps on the high voltage secondary winding selected *via* a relay controlled by the amplifier front panel VOLTAGE LOW/HIGH switch. Another relay controls the AC input, again switched from the front panel of the amplifier *via* the POWER ON/OFF switch while further relay action controls the switch on surge current *via* surge resistors. Both primary leads are fused and a full-wave bridge rectifier provides the high voltage output of approximately 2200 volts for the anodes of the 3CX800A7 valves. A two-speed switch for the linear fan is fitted.

It is interesting to note the manufacturers *absolute* maximum ratings for these triodes in class AB2 service (per pair):

Anode voltage (DC under load).....	2500 volts.
Anode current (DC under load).....	1.2 amps.
Anode dissipation.....	1600 watts.
Grid current.....	120 milliamps.
Grid dissipation.....	8 watts.

In the Titan circuit these valves operate with a considerable safety margin as the grid current required is only between 20-80 milliamps. In any valves of this type the quickest way to damage or destroy them is by excessive grid current and therefore excessive grid dissipation. If the grid current should approach the maximum of 120 mA, the LED marked OVERDRIVE will automatically illuminate as a warning irrespective of the meter reading.

With the valves parallel connected in a grounded-grid circuit, being cathode driven, there is no need for a filament choke and a tuned input circuit is used for each band. Maximum input power is 3 kW (2 kW CCS rating) requiring less than 100 watts drive. With an efficiency of 65% the output power is 1500 watts CW or SSB and 1000 watts in the RTTY and SSTV modes with full high speed QSK ability if using a QSK exciter. The LOW/HIGH power anode voltage switch circuit maintains maximum efficiency at low power.

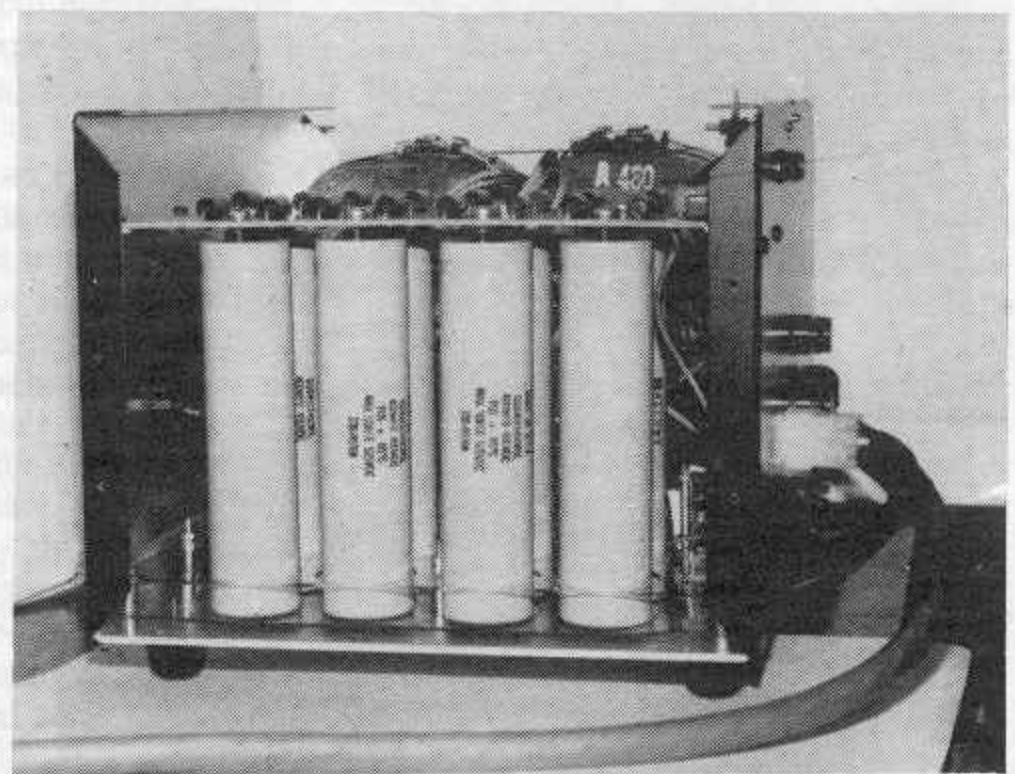
The output stage contains a two-section Pi-L network which is rather unusual as it has one more section than the normal Pi

coupler but it removes the need for large value loading capacitors on the low frequency bands and also provides harmonic rejection of more than 50dB; this type of circuit does however, require that the variable capacitor in the load position has a wider spacing than those used in the standard Pi network. In this amplifier the capacitor vane spacing is more than adequate. Another interesting point showing KW Ten-Tec's attention to design efficiency is the output tuning capacitor which is, in fact, a split-stator type, the two sections are paralleled or not depending on the band in use, by a section of the band change switch. This also brings in a fixed capacitor to increase the total available capacity for operation on 160 metres.

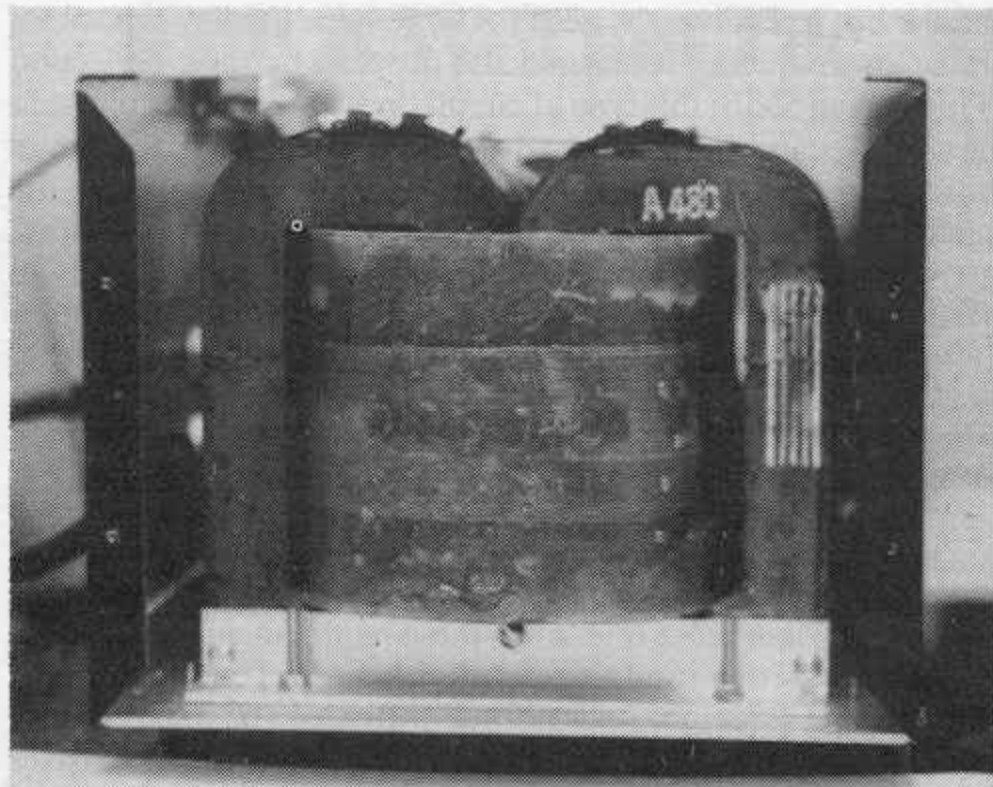
In any high power linear the switches used in the RF section must be really well made with a positive movement and contacts with good surface area well spaced from each other. The switches used in the Titan more than meet these requirements and a close examination of them and associated wiring with Teflon insulation reveals a first class job. As is normal with KW Ten-Tec products there are a number of separate interconnected printed circuit boards upon which are mounted various sections. They are individually identified as Bias Switch, Relay Board, Low Pass Filter, SWR Bridge, Display Meter Switching, and so on, which means that when one looks inside it is not a case of "I wonder what that does" or "How do I get at that"!

Upon switch-on there is a mandatory heater warm-up time of three minutes to protect the valves from cathode current flow and this is provided by a time delay circuit which also activates the 'Wait' LED. During this period a relay has disabled the T/R circuit of the amplifier. When the delay time has elapsed the relay closes, the 'Wait' LED goes out and the 'Standby' or 'Operate' LED will illuminate depending upon the position of the mode switch. A positive cut-off bias of 28 volts is applied to the cathodes, (in effect negative grid bias) when the T/R relays are open, this being reduced to 8 volts when they are actuated during transmit periods.

Full CW break-in is no real problem using low power, the troubles start when power is raised to above the accepted QRP level of 5 watts and one reason why so many of the black box manufacturers quote "semi break-in" or even "break-in" as *they* think it is. This being so at the 150 watts level, one can imagine something of the difficulty in designing and producing a linear capable of some 20 times this power and yet still be able to operate happily in this mode in addition to SSB, AMTOR, RTTY and SSTV. As is to be expected the circuitry in the Titan to enable this to be achieved, is somewhat complicated and most of the operation is centred on the Bias Switch board. The KW Ten-Tec



A side view of the power supply showing the eight computer-grade electrolytics with rectifier board mounted above.

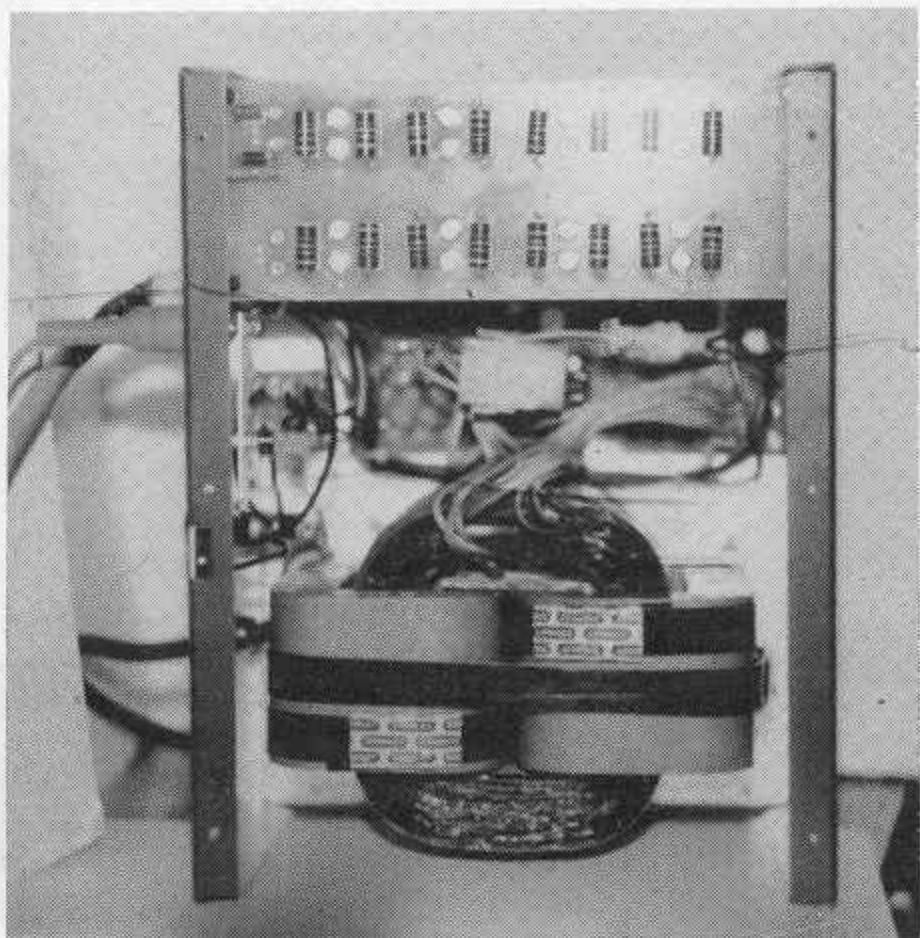


Reverse side view showing the construction of the massive mains transformer in the power supply.

manual takes two full pages, plus circuits, to describe the various functions involved so only a brief outline is given here.

First let it be stated that the manufacturers claim "full break-in keying is possible to speeds well in excess of 50 w.p.m., provided that the exciter has equivalent capability, which all KW Ten-Tec transceivers do".

The system used in the Titan involves a vacuum relay operating within 2 ms and various others switching in no more than 0.5 ms. The circuitry prevents these relays being switched while RF is present (hot switching). If any RF from the exciter is sensed prior to key down the amplifier will not switch to the transmit mode; conversely if any RF is sensed after key down, the amplifier will not switch to receive. This reads easily enough but is a difficult sequence to achieve in practice as it involves various circuits activating and de-activating electrically and mechanically at a speed sufficient to allow full break-in keying.



Top view of the power supply showing mains transformer with multiple rectifier board above.

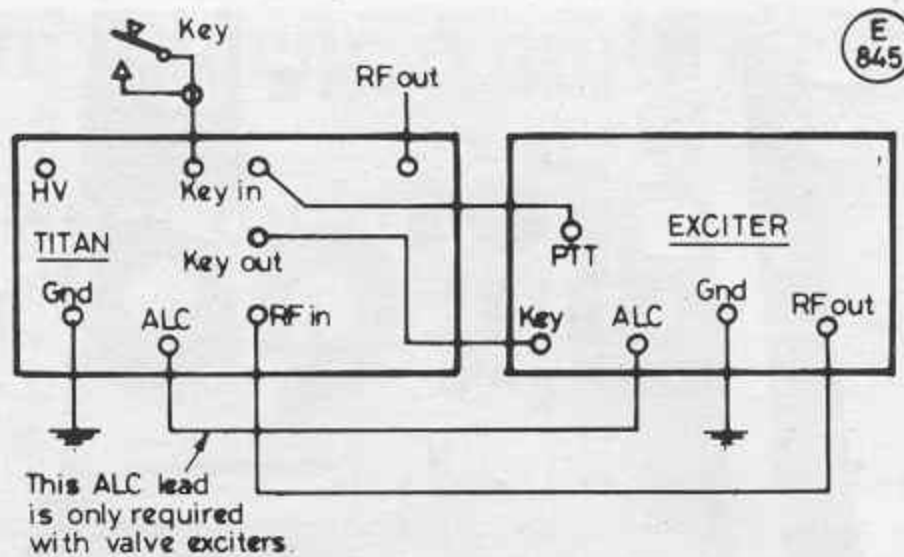


Fig. 1 Simple method of connecting any transceiver to the TITAN for cw or ssb operation

The built-in ALC detection and control circuits enable the rear panel mounted ALC Adjust control to set the threshold of operation to suit the exciter in use. High voltage fault current limiting is provided in the power supply and also in the amplifier itself. In the latter if a fault should occur and the positive high voltage line be accidentally earthed, the current is limited to a safe level and a diode provides a fault current return path to the power supply.

The SWR bridge circuitry bears some similarity to that built into the KW Ten-Tec high power ATU and uses a wattmeter with a forward scale of 2500 watts and a reverse scale of 250 watts. As this range represents a ratio of 10:1 it is easy to check that the SWR is below 2:1, by operating the FWD/REV switch.

The writer was present during initial tune-up and soak testing at full power into a power meter and dummy load by the KW Ten-Tec engineers. Tuning and adjustment was simple, neither the power supply or linear showed any signs of stress whatsoever and fan noise was minimal.

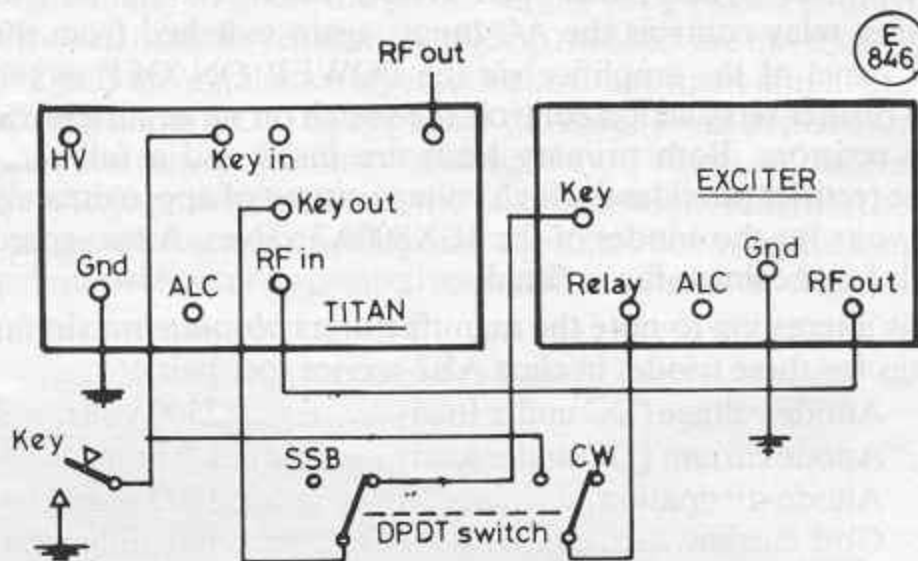


Fig. 2 This method allows switching between full CW break-in operation and conventional SSB PTT or VOX. The desired mode is selected by the external switch.

The Owner's Manual supplied with the Titan is well produced and contains detailed descriptions of the various circuit functions together with three pages of "Trouble Shooting Hints". Also included are suggestions for connection to transceivers with characteristics not quite suitable for driving the Titan, i.e. those with a degree of RF present under key up conditions and, of course, connection to the range of KW Ten-Tec transceivers. The manual warns that using an amplifier of this power, with a nominal output impedance of 50 ohms, the aerial must be resonant within the limits of 25 to 100 ohms or a SWR of 2:1 or less. The use of a suitable high power ATU is recommended, the KW Ten-Tec Model 229A tuner or Model 4229 kit being suitable and matching.

Thanks are extended to KW Ten-Tec Ltd., for their co-operation.

VHF BANDS

NORMAN FITCH, G3FPK

HOPE you all had a pleasant Christmas and may be found some time to operate on the VHF Bands. This month's piece includes reports on some welcome *Auroral* activity, some excellent tropo. propagation and packet radio developments.

Awards News

Another reader has joined the select band of 70cm. operators who are members of the QTH Squares Century Club. He is Dave Robinson, G4FRE, from Felixstowe in Suffolk (AL07a) whose membership certificate no. 4 was issued on Dec. 10, 1986 for 101 squares confirmed. 21 countries were represented in his list and all were SSB tropo. contacts. The cards have taken on average just over 13 months to come through the QSL bureaux but he still awaits a Jersey confirmation from GJ8KNV after *three years*.

First licensed in 1974 as G8JMO in Warwickshire, Dave got the present call in 1977 and moved to a poor QTH in Ipswich in 1979, then to Felixstowe in 1983. The QTH is 5km. from the sea and best take-off is south to southwest. The initial station at AL07a consisted of a *Trio* TS-120v and *SSB Electronics* transverter, now superseded by an *Icom* IC-402 with 3SK97 front end. An MGF1402 mast head preamp. is used and a single 4CX250B, 200W amplifier feeds four home made 17-ele. *N.B.S. Yagis*.

John is active on *E-M-E* having already worked five of the 21 stations heard so far. He also operates all bands from 24GHz to 70 MHz and has loaned his 4m. and 70cm. gear to the *Square Bashers Group* for their expeditions. Best tropo. DX is OY9JD/P (WW) at 1,225 kms. and he figures he will "retire" when he gets to 150 squares.

Congratulations to Irwin Brown, G11JUS, from Newtownabbey in County Antrim (X021g) who was issued with membership certificate no. 389 for the 144 MHz VHF Century Club on Nov. 17. Some station and personal details were on page 373 last month. He decided to do it the hard way by only listing QSLs received from stations worked outside the British Isles, a real challenge for anyone from Northern Ireland. His list covers 13 countries, notable QSOs being IW2CSM and HB9BZA *via* MS, SP9s CSO and MM

via Es and SP9DDV on tropo., and LX1JX.

The Satellites

No reports this month from anyone who has actually been using any of the available satellites but the following notes mainly originate from the weekly bulletins from the *University of Surrey*. These bulletins are loaded into *UO-9* and *UO-11* and transmitted at regular intervals. Details of the software and hardware necessary to receive these transmissions have been published by *AMSAT-UK* for those new to the idea.

The control station at the *UoS* has undergone extensive refurbishment and both *UoSATS* returned to scheduled operations on Nov. 28. The ground station controller is now fully operational. The CCD camera on *UO-11* has been tested recently, "... with some encouraging results returned on Nov. 24." The camera is very sensitive and easily over-exposes. Experiments have been conducted when this satellite is over the terminator or twilight line, therefore.

The *UO-11* schedule now includes the *Digitaltalker* on Wednesdays and Steve Holder at the University has been working on a software program which should eventually allow it to read out stored messages. On Nov. 28, a whole orbit data (WOD) survey was carried out to assess the effect on the battery voltage of having both the 145 and 435 MHz beacons on together for twelve hours. Although this did show a discharge superimposed on the normal charge/discharge cycle as the spacecraft leaves and enters the eclipse, the amount of discharge was not considered a problem.

Now to the Japanese *FUJI* satellite, know officially as *FO-12*. This operates on a negative power budget which means that when the transponders are on more power is consumed than is generated by the solar cells. The *JARL* has reported that *FO-12* was turned off from Nov. 22 through 28 inclusive to allow the batteries to recover, following extensive experiments with the digital, mode JD, transponder earlier in the month.

OSCAR-10 continues to confound us and is now available for low power transponder operation but which is often interrupted by control station activities. Would be users are requested to listen to the various *AMSAT* nets and to listen for newflashes from *UO-11*. From the *UoS UO-11 Bulletin* of Nov. 27, the following explains the latest news:-

"All efforts to this time have concentrated on using the first 512 bytes of the IHU memory, since this is the memory into which the 1802 computer will automatically load uplinked data. Through the unflagging efforts of the *AO-10* command stations (DB20S, ZL1AOX and VK5AGR), the whole 14 kbytes of the IHU memory were tested. Several blocks

of the higher memory were in much better condition than the lower area. If programs can be loaded into this higher memory, there is hope of bringing the satellite further under control."

Anyone who has "peeked and poked" into a computer's memory knows what a tedious and lengthy business it is. So hats off to those who have been doing this remotely at anything up to 40,000 kms. range. It proves that radio amateurs are every bit as resourceful as the professionals concerned with the remote control of spacecraft.

Packet Radio

In a *Press Notice* dated December 1, the *DTI* states it, "... has cleared the establishment of ten experimental amateur radio packet relay stations." The linking together of repeaters in this network has been agreed to in a 14 month experiment to be run in cooperation with the *RSGB*. It is suggested that links to HF stations and satellites be encouraged and mention is made in the *DTI* note of the *UoS's* plan to retransmit packets via *UO-11*.

As of the beginning of December, about half the 2m. PR relays were operational and the fine tropo. conditions at the end of November enabled London area stations to work up to Yorkshire and down to the Channel Islands. In the *GB2RS News Bulletin* on Nov. 30, it was stated that the Yorkshire PR switch relay had been licensed for operation. It will use vertical polarisation on 145.275 MHz. Your reports on PR relay use would be welcomed along with details of point-to-point PR operation on the "official *RSGB*" PR frequency 144.65 MHz.

Roger Thorn, G3CHN, (IOW) reported a PR QSO on 2m. between Peter Graham, G3GLK, in Ventnor (IOW) and Spanish stations EA1ED and EA1QJ on Nov. 28. He suggests these may well have been "firsts" for the mode on VHF.

Worked All Britain

More and more operators are becoming involved in the *WAB* awards program and many VHF-ers are offering their *WAB* square with the usual QTH details without being asked. John Fitzgerald, G8XTJ, (BKS) has sent a list of the numerous nets where the addicts gather to work new squares. The majority of these are in the region 144.430 to 144.460 MHz. The following format is day/QRG/start time (local)/control area:-

Monday,	144.440, 2000, Midlands,
Wednesday,	.440, 2000, N. England,
„	.430, 2030, S. coast,
Thursday,	.460, 2000, East Anglia,
„	.430, 2000-2030, S. Wales,
Friday,	.440, 2000, N. England,
„	.430, 2030, London,
Saturday,	.260, 1100, Cheshire,
Sunday,	.430, 1030, London,

Mobile stations are often in these nets

operating from squares where there are no fixed stations.

John also included a sheet of *WAB* award "firsts" starting with the *Diamond Award* for working 1,500 areas and which went to Laurie Segal, G6XLL, London. An engraved trophy comes with this. The next to claim this award were Haydn Barker, G6XVV, (YSS), Jack Charnock, G4WXX, (MCH) and Roy Thornley, G1NUS, (CHS). The first *Basic Award* for 100 areas on 23cm. went to Graeme Caselton, G6CSY, (KNT). For all information about *WAB* and its awards programme, send an *s.a.e.* to G4KSQ who is *QTHR*.

Contests

First some results, broadcast over *GB2RS* recently. In the July 26, 1986 144 MHz Low Power event, the Fixed station section attracted 57 entries and the clear winner was G4NXO with 179,275 points from 303 valid contacts. Runner up was G6XVV 134,550/254 and G1GSU was third, 95,744/278. The All-other part was won by GM0CLN/P, 274,950/329; 2nd., GW4MGR/P, 214,877/330 and 3rd., G3WOI/P, 162,375/317. This section resulted in 51 entries. The winner of the SWL section was BRS 32525 with 34,648 pts., runner up BRS 25429 with 30,820 pts.

In the 1986 10 GHz *Cumulatives*, the narrowband section winner was G4ELM/P and G3YGF, who was the leading fixed station, was second. The *Alpha Cup* winner was G0BTA, whose portable effort won the wideband section in which second place went to G3PHO/P. G3YGF was the leading fixed station in this part, too.

As to forthcoming events, as *RadCom* is very late again, no details are to hand of any imminent contests but last year, the 70 MHz *Cumulatives* started at the end of January with a 144 MHz CW contest on the first Sunday in February. Looking to March, the *Derby and District ARS* has advised of what it hopes will be the first of an annual series of 144 MHz contests, this year's being on March 15, 1300-1700 GMT. There are three sections: Full legal power; Low power (25W max. output) and SWL. Exchanges to comprise call/RS(T)/serial no./administrative county. Contacts with club station G3ERD count for 10 points, all other QSOs 2 pts. There is a multiplier comprising the total number of different counties worked with countries outside the U.K. worth one point. Final total is QSO pts. times multiplier. Entries to *DADARS* to arrive by April 1 at 119 Green Lane, Derby, DE1 1RZ. Send an *s.a.e.* for copy of the rules.

Six Metres

After all the hype leading up to the release of the 50 MHz band to Class A licensees last year, one wonders what all the fuss was about. Once the possibility of

transatlantic E-layer DX in the summer vanished, it seems that this band virtually ignored by all but a few enthusiasts. At least on 4m., the occasional contests create some activity and the GB4MTR project was another useful idea to promote continual interest. Perhaps we should consider introducing some friendly, competitive schemes for 6m. to try to encourage more use of this new band.

Bryn Llewellyn, G4DEZ, (ESX) has just got going on the band. He uses his *Trio TS-780* on 2m. and transverts with a *TVVF50c* from *muTek*, and the antenna is a 4-ele. *Yagi* from *Jaybeam*. This can provide the legal 100W *e.r.p.* Flemming Jul-Christensen, G4MJC, (SXE) sent in a long letter covering activity from late June last year which he ruefully sums up, "All in all, very poor results bearing in mind what is heard here daily. ZB2VHF was heard every day for three months or so, but these EAs, CTs and ZB2BL can only work stations who are S9-plus." G4MJC has worked five squares and two countries. It would be interesting to learn about the level of TV video QRM in EA, CT and ZB2 in the summer; maybe it is so bad that 100W amateur signals are just swamped.

The 6m. saga began in the U.K. with the issue of a small number of special permits for a probationary period and the Norwegian authorities adopted a similar scheme, with about 30 LAs using the band. From Jan. 1, the band will be available to all but with certain power level and geographical restrictions. Norway still has a number of Band 1 TV transmitters in regular service so amateur 6m. operation will probably be restricted to outside of TV broadcasting times.

Four Metres

The only reader mentioning 4m. this month is Tony Collett, G4NBS (CBE). He writes that, in an attempt to solve his TVI problem he changed sets only to, "... score an own goal ..." even though the situation on 2m. and 70cm. is improved. So activity in the contest on Oct. 26 was cut to only 32 QSOs. Conditions were poor with very deep QSB on all stations from any distance. Tony worked 20 counties and G3YEU (GLR) and GM0FRT (GRN) were all-time new ones. G4MGR (MSY) and G3CUN (WMD) were new for the 1986 table. The GM and EI2CA were quite a struggle to work on CW because of the QSB.

No report from G4VOZ this time, but it would be useful to have a report on the outcome of the GB4MTR operation, and which has just finished. It would seem to be an experiment well worth repeating using a different set of counties and operators.

Two Metres

To begin, a welcome couple of letters from Charles Coughlan, EI5FK, (Co. Cork) who climbed four 3,000 ft.

QTH LOCATOR SQUARES TABLE

Station	23cm.	70cm.	2m.	Total
G8TFI	79	141	126	346
G3XDY	77	130	177	384
G3JXN	77	119	172	368
G4NQC	63	99	234	396
G4FRE	63	136	84	283
G3UVR	61	106	213	380
G4JCD	59	117	239	415
G4NBS	56	92	81	229
G6MGL	48	85	135	268
GW4LXO	45	100	240	385
G3COJ	44	102	175	321
G4DEZ	44	24	246	314
G3PBV	41	106	200	347
GW4TTU	37	87	238	362
G4ZTR	35	57	82	174
G4RGK	34	90	224	348
G1EZF	32	86	200	318
G4DCV	25	71	248	344
G4MCU	25	82	201	308
G8HHI	23	96	135	254
G4MUT	23	87	140	250
G1KDF	23	85	137	245
G1DOX	20	27	49	96
GW3CBY	18	46	107	171
G6CSY	16	39	34	89
G3BW	15	38	269	322
G8GXP	13	133	296	442
GM8BDX	13	31	41	85
G6XVV	7	38	174	219
G6AJE	3	51	90	144
G4RSN	2	34	92	128
G3IMV	—	116	395	511
G3POI	—	—	448	448
G4KUX	—	57	322	379
YO2IS	—	37	341	378
G4JJE	—	—	338	338
G4XEN	—	98	225	323
G9XVJ	—	86	213	299
G4TIF	—	106	178	284
G4DHF	—	—	280	280
9H1CG	—	—	276	276
G6HKS	—	65	186	251
G6HKM	—	98	152	250
GM4IPK	—	—	245	245
G4OAE	—	46	195	241
G3FPK	—	—	219	219
G6DZH	—	82	136	218
I4YNO	—	—	214	214
G4SSO	—	54	158	212
G4SFY	—	—	208	208
G4MJC	—	25	182	207
G6ECM	—	—	200	200
G4MEJ	—	—	198	198
G4IGO	—	—	198	198
G8LFB	—	—	194	194
G4YCD	—	35	148	183
G1EGC	—	39	143	182
G0CHE	—	—	181	181
G1LSB	—	101	75	176
G4YUZ	—	—	168	168
G4XEK	—	—	165	165
G8ZDS	—	41	123	164
G4VPM	—	46	117	163
G8MKD	—	45	113	158
G4DOL	—	—	154	154
GJ6TMM	—	26	127	153
GW8VHI	—	48	101	149
G6XLL	—	36	109	145
G6YIN	—	58	87	145
G4CQM	—	52	87	139
EI5FK	—	2	130	132
G8RWG	—	13	105	118
G6XRK	—	—	117	117
G0FOT	—	54	49	103
G4TGK	—	—	98	98
G8XTJ	—	—	98	98
G4JZF/P	—	80	—	80
G1DWQ	—	—	72	72
G0FBG/PA	—	17	54	71
GW6VZW	—	—	69	69
G1PDW	—	—	55	55
GU4HUY	—	—	54	54
G1HGD	—	7	38	45
GM6XPI	—	7	38	45
G1CRH	—	—	41	41
G2DHV	—	4	26	30

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

mountains in 7½ hours on Nov. 15. He had no radio gear with him but reckoned he would have loved to have operated from some of these high sites. He was QRV in the *Aurora* on Nov. 4 which started at about 1540 and ended around 1833, QTE being about 20°. He contacted GM0ATQ and GM4ZNC, both in XP, GM4UFD (ZR), GM4ILS and GM4ZUK (YR) and GM3JFG (XR). A Swedish station was heard.

Earlier, on Nov. 1/2, Charles operated from UL30d in poor conditions, using 100W and G2BCX type of antenna. QSOs were made with G0CUZ (YM), G8ZVM

(XK), G1KDF and G6YGP (YN), G3TSL, GW3KJW (XM) and G6HCV (YM). His best DX was G4KUX (ZO21e) and several other contacts were made with GI and EI stations. So far EI5FK/P has worked 26 squares from UL30d.

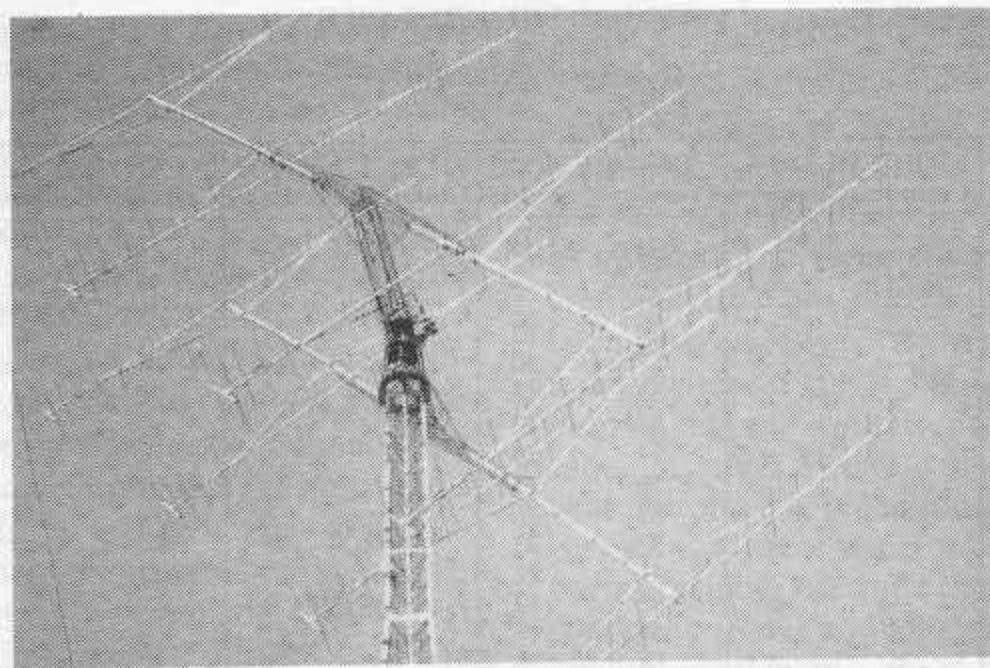
Mike Honeywell, G0ABB, (HPH) has enjoyed 1986 CW activity and reckons it has built up his confidence with the key. Indeed, he says his *HK-802* key is nearly worn out. The months of October and November brought him another 71 stations including some GMs in one of the *Ar* events, with tropo. accounting for three Ds, 12 Fs, two ONs, five PAs and an OZ.

Colin Morris, G0CUZ, (WMD) was QRV in the Nov. 4 *Ar* from 1430 to 1905 but reports it as not too good. Some GMs were worked and LA8OJ (CS) and LA9FY heard at 1705 and 1853 respectively. The event on the 25th was much better with GMs workable on SSB best DX being GM0DRU on Harris (WS) for a new square. The only DX worked was OZ1FGP. OZ1CTZ was heard at 1455 and RQ2GAG at 1735, the GM stations being best around 1700. The event was from 1400-1850.

Nov. 29/30 saw good tropo. propagation with EB1MS/P (XC) at 1650 and EA1OD (XD) at 2025 worked on the 29th plus many Fs from western France. The Spanish beacon EA1VHF was quite strong around 1600 sending "EA1VHF IN53SI" on 144.867 MHz. Conditions on the 30th were good all day and best DX were OZ4D and DK3LL (FO), and DK1KO (FN) with OZ6OL (GP) heard working your scribe, and Y33VA (GO) also heard at 1730. On the MS scene, Colin reports a very poor month which brought random QSOs with OK2PZW and OK2KZR (IJ) plus completed skeds with YU7CV (JF) and YU7FF (KF). He is one of a growing number of MS operators who favour 2½ min. periods for random CW QSOs. G0CUZ has now heard W5UN off the Moon during a recent *E-M-E* weekend, mostly RST219 but 519 at 1203 on Nov. 23, that with a 5-ele. *Yagi* and 2 dB of feeder loss.

Bob Nixon, G1KDF, (LNH) heard numerous GMs, LA1ZEU and LA9RAA in the Nov. 4 *Ar*. In a brief opening around midnight Nov. 6/7 he worked FC1GXX (ZF) and heard another F in AD at S1. Then three more *Ar* events; on the 24th, 1800 to 1950, many GMs heard with GM4SUF and GM4UPC in XR worked, plus GM3ZET (SLD) at RS58A each way. The next day, 1900-1945, more GMs heard but on the 30th, only GI8AYZ and LA1ZE heard. Bob's station details, missing from last month's notes in the awards section, are *Trio* TS-780, *B.N.O.S.* 180W amplifier and 17-ele. *Tonna Yagi* at 30ft. with *Pope H-100* feeder.

Paul Brockett, G1LSB, (LCN) dashed off a quick note mentioning the good tropo. on Nov. 29/30 which brought some



The impressive E-M-E 2m. antenna array of Giancarlo Salvioni, I4BXN, consisting of two stacks of four 20-ele. Yagis. These antennas are 8.2m. long, designed by I2ODI, and the group is mounted on top of a 25m. tilt-over tower.

small additions to the tables. He did not make it clear what band he was referring to, but the stations he listed were probably on 70cm. Ian Rose, G1PDW, (ESX) had thought there would be nothing much to report so was pleased with the last-minute tropo. in which his best DX were GU1WDT, EI6AS (WN), DL3LAB (EO) and EI9GJ/P (WM).

George Haylock, G2DHV, (LDN) keeps several lists going for the *Magazine* and local radio society use so has got his table totals a bit muddled at times. He has now been through everything carefully and come up with definitive figures from his poor QTH. Incidentally, at G3FPK for VHF use, the Squares and Annual tables data are kept on the little ZX-81 using a *Psion* "VU-FILE" program which allows continual up-dating. It is a simple matter to order the Squares table figures by the "Band of the Month" and it greatly reduces the time in compiling these long tables compared with the old hand-sorting method. Most home computers should have similar software for such lists.

Pat Billingham, G4AGQ, (SRY) left it rather late so telephoned his notes to the office. He found conditions in the CW contest on Nov. 1/2 "abysmal" the one bright spot being GM4YXI, the first GM worked under normal conditions. G4DEZ has 400W capability on 2m. but does not use the band very much now. His transceiver is the respected *Yaesu* FT-225RD with the *muTek* "front end" and no pre-amplifier. The feeder is UR-67 and the antenna a *Tonna* 17-ele. *Yagi*. Bryn wonders why it is that he can give a station running 10W a genuine S9 report while he only gets an RS41 from the other station from his 400W? (Probably using a diode front end. Ed.).

Jim Challenger's, G4EIB, letter just missed last month's deadline so his notes covered October. He remarks that he seems able to work EI, GI, GM and the south coast from Dudley (WMD) under flat conditions. He runs 35W of CW to a 14-ele. antenna at 35ft. but the QTH is

750ft. *a.s.l.*, which is probably the answer. G4MJC's letter covered events from June 20 when he had six minutes *Es* QSO with LZ1ZB (LB) up to the early-October period. His letter, dated Oct. 18, has only just reached your scribe, so where the hold up was is not known. In summary, Flemming wrote that he is pleased with all the new squares worked and is looking forward to getting some of the QSLs.

G4NBS's only 2m. activity was in the CW contest and he, too, complains of the appalling conditions. He made 62 contacts in the 24 hours, 47 of them in a 4½ hours period on the Sunday. Tony only worked one PA, 2 ONs and three Fs, heard a German but did get a few more distant GMs, best DX being 549 kms. Ian Cornes, G4OUT, (SFD) had worked 208 different CW operators up to Nov. 19 and has been busy building a narrow filter to improve weak signal reception. This was not ready in time for the Nov. 1/2 contest but he hopes to have it working properly in time for the Feb. event. He mentions a "first" for G4OUT in working a mobile using CW on the move as opposed to the more usual parked-in-a-lay-by mode.

John Palfrey, G4XEN, (NHM) has been active on MS and on Nov. 17, worked SM2CEW for the third time out of four skeds. The SM subsequently sent a photo of his 6 x 16-ele. array and of his shack. The next day John worked YU7CV (JN95) at the fourth attempt in one week. One sked failed due to having no power and in the second sked, he was 1 kHz low frequency. On the 28th, John was surprised to complete with SP9CSO from 1200-1220 when there was no meteor activity he knew of. (*DUBUS* lists a couple of *Ursa Majorids* showers embracing that period. Ed.). Best DX in the tropo. opening of Nov. 29/30 was OZ1IUK (JO66) and the northern DLs were really loud. DL0PR beacon was S9 and on the 30th, around lunchtime, a weak and watery SK7VHF was copied.

June Charles, G4YIR, (ESX) wrote a

ANNUAL VHF/UHF TABLE

January to December 1986

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G1KDF	—	—	94	24	80	16	30	7	251
G4NBS	47	5	72	22	59	21	48	18	240
G1DOX	—	—	83	11	50	8	30	5	187
G1LSB	—	—	70	22	62	21	—	—	175
G0CUZ	—	—	87	30	43	14	—	—	174
G6XVV	—	—	83	17	42	7	20	4	173
G4SEU	56	5	62	13	30	4	—	—	170
G6HKM	—	—	74	26	52	18	—	—	170
G4TIF	57	6	50	17	25	12	—	—	167
G4MUT	35	4	59	16	34	8	14	5	156
G4YCD	—	—	82	23	39	7	—	—	151
G4DEZ	—	—	51	21	26	7	27	13	145
G1SWH	—	—	87	13	15	3	—	—	118
G6AJE	—	—	49	14	39	11	3	1	117
G4HGT	21	2	68	16	6	2	—	—	115
G6MGL	—	—	27	9	32	8	22	8	106
G3FPK	—	—	80	26	—	—	—	—	106
G6ECM	—	—	79	24	—	—	—	—	103
G6OKU	—	—	61	9	25	2	—	—	97
G1EHJ	—	—	49	6	36	4	—	—	95
G4WXX	—	—	79	14	—	—	—	—	93
G4VOZ	44	5	—	—	33	5	—	—	87
G4AGQ	16	3	42	13	10	2	1	1	86
GW6VZW	—	—	64	19	—	—	—	—	83
G8XTJ	—	—	65	17	—	—	—	—	82
G1PDW	—	—	63	17	—	—	—	—	80
G6XRK	—	—	60	17	—	—	—	—	77
G6YIR	—	—	57	17	—	—	—	—	74
G4TGK	—	—	58	16	—	—	—	—	74
G4EZA	—	—	46	13	9	1	—	—	69
G1CRH	—	—	56	12	—	—	—	—	68
GU4HUY	—	—	52	11	—	—	—	—	63
GW4HBK	53	7	—	—	—	—	—	—	60
G8RWG	—	—	45	9	4	1	—	—	59
G2DHV	8	2	36	6	2	1	—	—	55
GM6XPI	—	—	29	12	5	4	—	—	50
G1HGD	—	—	17	4	13	2	—	—	36
G6CSY	—	—	9	4	13	3	—	—	29

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

couple of days before the tropo. lift so did not have much to report. She was on for an hour in the CW contest and worked five new ones for the ladder and a total of 14 new stations for the month. Ron Reynolds, G6WEM, (ESX) was another who thought there would be nothing worth reporting in November but who cashed in on the late opening. He worked G0AEA (IOS) who was booming in, as was the GB3CTC beacon, on the 28th. Colin reported that the LAs and SMs were working into EA and CT around 0200 on the 29th but it was all going over our heads. Ron mentions lots of PAs and ONs worked and amongst them on the 30th, he found DG1DAS/M (JO31MK) with a Yaesu FT-290 and 25W. GW0GAH in Anglesey was a new square, too.

Mike Huggins, G6XRK, (ESX) confirms he was on during the Sept. 20 Es event when I4YNO noted a similar call. Mike runs 400W from a Dressler D-200S amplifier and 17-ele. Yagi, so should be a big signal, anyway. On Nov. 29, his best DX were F6ARQ (AF), F6CIS (ZE) and F5BV (ZF), the next day bringing some Scandinavian DX, including SM7LXV (GP) and OZ1LJK (FP). He worked a string of OZs in FP and lots of Germans.

G8XTJ found EA1TA (VD58b) in the early hours of the 29th for a new 1986 country and later, GU3EJL (ALD), a new island for the WAB Islands Award. Stan

was a tremendous signal. John's other new county was EI3CNB (IO57) in Cork on the 30th. During the lift several PAs were heard calling for WAB squares so the idea has its overseas enthusiasts too. At G8XTJ, Ambassador telephone QRM is rife in the W to NW direction so a session with an FT-290 and HB9CV antenna seems likely to track the offending thing down.

Irwin Brown, G11JUS, (ATM) writes: "Please let readers know that there is a hard core of ten to twelve operators in GI who are always looking for 2m. SSB contacts, even under 'flat' conditions". From Wales, Paul Baker, GW6VZW, (GWT) was glad to have something good to report at last, referring to the Nov. 29/30 tropo., of course. On the 29th, he worked EB1CVE (YD), F6GWL (ZF) and FC1FGC (ZG) for a new square. The next day he got five more new ones, PE0IPP (CN), PA3EKK (DM), PA3CEG (DN), DL3LAB (EO) and DJ9YE (EN). Other DX included DB2QG (DN) and EI3CNB (VL). Paul worked 35 stations in the period but missed out with XC and EM squares.

At G3FPK your scribe was alerted to the Nov. 25 Ar by a telephone call from John Hunter, G3IMV, at 1515. Lots of GMs were heard at ZL60j up to S5 and all beam headings were 0-10°. The more distant stations heard included SM4IVE at 1604,

LA8OJ and LA8SJ at 1625 and RQ2GAG (KO26AW) at 1715 and who was best copy at QTE 20°. The event seemed to fizzle out at about 1920. Few southern operators seemed to be aware of the event which was caused by a disrupted filament ejected from the Sun during a disturbed period from Nov. 24 to 30. The geomagnetic A index rose to 29 on the 25th.

Seventy Centimetres

EI5FK is now QRV on 70cm. with 10W and a 15-ele. Quagi antenna fed by H-100 cable. Charles was equipped for the band when at UL30d on Nov. 1/2. Stations worked were G1KDF, G16ATZ (XO), GW3KJW (XM) and EI7VS (VM). He is QRV on Monday evenings, 8 to 10pm and promises to be on in the Cumulatives perhaps with 50-100W later.

G0CUZ worked down to EBIMS/P (XC) on Nov. 29 and Colin also found Fs in BG and ZG which were new squares. After many attempts, he finally worked EI5FK (VL) on the 30th for a new one. G1KDF worked GM6XPI on the 9th for a first contact with Central Region. This was Bob's 74th out of the 78 U.K. counties. In the Nov. 8 leg of the Cumulatives he made 33 contacts compared with 47 and 41 in the first two sessions. The 13th brought G1DXI (HBS) for a new 1986 county and on the 29th, GU3EJL was all-time county no. 75, leaving just Western Isles, Orkney and Shetland for the Grand Slam. Numerous Fs were worked on the 29th. The next day brought very good conditions to F, ON, PA and DL with new square BJ worked twice.

G1LSB contacted F6DKW (BI) and F9LT (AI) for new squares on the 29th, other QSOs being with F5ZA (YI) and GU3EJL, also G8ZDS (XK). On the 30th Paul worked GJ3RAX for a new country and OZ1JPT (GO) and DL9LF (FO) for new squares. In a brief note, Gerry Schoof, G1SWH, (MCH) lists new counties EI6AS (Dublin) on Oct. 31, G1DXI (HBS) on Nov. 13, and on the 24th, G3CKR/P (SFD) and G4KZY/P (BRK).

G4AGQ's CW CQ call on Nov. 30 was answered by HB9AMH/P (DH) but it seems the HB could not read CW very well. Nothing else for Pat on the band on the key, "... as usual..." as he remarked. G4DEZ uses a Trio TS-780 with muTek Gasfet masthead preamp. 13W through LDF4-50 cable to an 18-ele. Jaybeam is Bryn's station. He says it is easier to work stations with low power than it is on 2m. and quite often he finds the band opening up unexpectedly for a time.

He finds the band now rather like 2m. was 10-15 years ago but with better equipment. To date Syledis operation has not been a problem in the Southend area although he can hear it. During the tropo. opening, Bryn worked into FO square and

heard OZ and EI stations weakly, whereas the Dutch were working those countries with ease. GU3EJL was S9-plus 30 dB. yet stations only a few miles away were only getting Stan at about RS41.

Graham Taylor, G4JZF, reckons the highlight for him from WMD was working into PA for the first time on the afternoon of Nov. 30, even though he was not able to operate for very long. G4XEN heard the OZ7IGY beacon on 432.930 MHz on the morning of Nov. 30 at S8 but no OZ or SM stations were heard, so nothing to report from John.

Ela Martyr, G6HKM, (ESX) thought there would be nothing worth writing about but then the tropo. lift came. Things got lively the evening of the 29th when GU3EJL and F5ZA (YI) a new square were worked. The following day there are 29 entries in her log, all continentals who answered CQ calls once a clear frequency had been found. Ela's best DX was OZ1JDU (HP) on Bornholm Island. Among many others contacted were OZ1s LJZ and KQG (FP), OZ8BZ (FQ), OZ1KYM (EP) and Y23SB (FN). From EN square, DG0BAP was contacted and he was only running 3W and a 5-ele Yagi.

The Microwaves

G1KDF took advantage of the Nov. 29/30 good conditions to push his totals along somewhat. Bob tried again with FD1FHI but unfortunately had no luck on 23cm. He also tried with G3LTF (ESX), PA0RDY (CM), PE1EWR (BL) but did make it with PA0EZ (CM) with RS52 reports each way for square no. 23. His station comprises a Trio TR-9130 with an LT23S transverter running 10w. The antenna is a 55-ele. Tonna Yagi at 30ft. with a DX1296S preamp. at the masthead. The feeder is Pope H-100.

G4DEZ is taking 23cm. very seriously and is using the Icom IC-1271E transceiver running 12W. He has four 55-ele. Tonna Yagis with Gasfet masthead preamp. the feeder being "one inch diameter hose pipe" with short lengths of UR-67 to the

power splitter. Bryn suffers a bit from radar QRM, "... but not enough to interfere with QSOs". As he has only recently become active on 70cm. he is often in the unusual position of first working someone on 23cm. then asking for a QSY to 70cm. In the recent lift, he worked into FO square.

G4NBS, whose letter was dated Nov. 21, before the lift, says he had only then been on for the Cumulatives. In summary, he found conditions slightly up in the 15 Oct. leg with 34 QSOs, but not so good on Oct. 31 when beam directions seemed a bit vague; 21 QSOs were made. On Nov. 16, the conditions seemed a little better than average with GB3MLE at S3 and GB3CLE at S1. However, activity was not as good as in the first session with several expected stations missing. Tony made 25 QSOs but had a bit of a struggle with PE1EWR. On the awards front, G4NBS has 39 countries and nine countries confirmed, so is just one country away from being able to claim his RSGB Senior Award for this band. He remarks how much easier it has been from Cambridge compared to the struggle he used to have from the old QTH in Slough.

John Tye, G4BYV, (NOR) sent a brief letter and mentions that Simon Freeman, G3LQR, (SFK) had two fine QSOs on 3cm. One with SM6HYG, the other with HB9AMH/P, but did not say when they occurred. On 23cm. John added GB2YS (YS) for square no. 77. On 13cm., DL7QY (FJ) was no. 50 and on 9cm. he now has 18 squares, the latest addition being G4CBW/P (AN). He now has 10W on 6cm. using SSB, reception being enhanced by a two-stage preamp. using Gasfets type NE72089. He has 4 squares on this band, the latest new one being G3ZEZ (AL).

DX-Peditions

Readers probably recall that last August, G4MJC operated from a ship going across the North Sea when he and his wife were going to and from their summer holiday. Flemming has written that the operation was quite good considering the limitations. His wife was holding the HB9CV antenna throughout. On Aug. 7, on the outward trip from BN square, stations worked were G4SWX, G4XNL, G6VYH, PA0GBL, PA3DUU, PE1IML, G4FDW, G4PIQ, G1EGC, G4NQC, G1HQQ, G4YPC and G4WFR. Operation was between 2215 and 2312 and the locators at start and finish, calculated from the lat/long. figures quoted, would be BN77g to BN58j. On the return voyage on Aug. 18, he operated from CO50a to CO58a between 2220 and 2240 only working three PAs in DK square.

Looking way ahead to next September, Flemming says four of them will make a similar trip, with operation planned from more "wet" squares and for up to nine hours continuously. The group is seeking publicity and sponsorship and possibly the loan of suitable equipment.

Contest Power

In the November issue, mention was made of changes in the rules for VHF/NFD in respect of power levels and antenna arrays, à propos remarks made by G3XDY in his RadCom piece covering the 1986 event. G4DEZ has written some pertinent comments and Bryn's main point is that it is far better to run a big amplifier well below its maximum power output capability than to try to squeeze the last watt out of a less potent one. He, and the very successful contest groups he is and has been a member of, quite rightly feel more confident that they will radiate a good quality signal by this approach.

But as he admits there are stations which will run such large amplifiers at higher power than is legal, giving them an unfair advantage over those adhering to the rules. Bryn cites an example of blatant QRO operation during a so-called Low Power contest some years ago. A portable station in GM, supposedly running 3W was S9 in Southend (ESX) so he called him at the same power the antenna array being two 17-ele. Yagis fed with low loss cable. No response. Then a call with 400W brought an S3 report from the GM.

Bryn quite rightly states:- "No way can a 3W station be 5 and 9 and only give 5 and 3 to a 400W station. . . just an insult to intelligence". He was so disgusted that he switched off right away and did not enter that event. Yes, it is puzzling why some of these QRP stations find it necessary to use a 200 cubic-foot-per-minute blower to cool their little PA stage.

Now this leads your scribe to make the mischievous suggestion that perhaps a contest should be arranged only for the cheats. Some readers may have seen a superb feature on TV called "Outback Bash" promoted and filmed by Australian entrepreneur Dick Smith. It was an hilarious car rally across the Australian outback over 2,000 miles or so wherein those who cheated most scored more points than did those playing the game. Bribery of the officials was actively encouraged, for example.

Finale

That's it for this month so please be sure not to miss the January 7 deadline for the February issue in which the final placings for the 1986 tables will appear. Send your "input" to:- "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 and a Very Happy New Year to all readers from G3FPK.

ANNUAL CW LADDER

Station	4m.	2m.	70cm	µWave	Points
G4AGQ	29	421	13	1	464
G0ABB	—	368	2	—	370
G4YIR	—	301	—	—	301
G4ZVS	—	225	—	—	225
G4SFY	—	221	—	—	221
G4OUT	—	208	—	—	208
G4ARI	—	164	43	—	207
G4EIB	—	178	—	—	178
E15FK	—	142	1	—	143
G4PPV	—	115	—	—	115
G4EZA	—	109	—	—	109
G4XUM	—	105	—	—	105
G4VOZ	58	—	26	—	84
G0DJA	—	78	—	—	78
G2DHV	7	61	—	—	68
G4TJE	—	52	—	—	52
GW4HBK	51	—	—	—	51
G0FB-	—	—	—	—	—
G/PA	—	42	3	—	45
GU4HUY	—	40	—	—	40
G0FOT	—	32	2	—	34

No. of different stations worked since Jan. 1.

• • • "Practically Yours" • • •

with **GLEN ROSS, G8MWR**

LAST month we looked at some of the multitude of colour codings of component values that are commonly found and gave listings to enable you to sort them out. This month we take a look at components which are marked in what appears to be plain language and yet can be, perhaps, more difficult to decipher. The real problem now is to actually get the information printed on to the very small components which we are using and the problem is getting even worse. The latest families of components are simply built in tiny blocks of material that are about the width of a small PCB track and maybe 0.1 of an inch long. These components are frequently not marked at all, it being assumed that they are going in to the manufacturing side of the industry and that the stock control department will keep them in marked boxes and issue the right value to the production line.

Letter Coding

The first group of coding we look at is shown in the various sections of Figure 1 and should be fairly self-explanatory, but even so a few notes and examples may help. Resistors are marked in the same fashion as tubular capacitors but without the temperature coefficient marking. The tolerance coding is shown in Table 1. Any figures following this are to indicate the working voltage of the component.

Table 1.

F	=	1%
G	=	2%
J	=	5%
K	=	10%
M	=	20%

Examples

A disc ceramic capacitor is marked 103, from our tables we can decode this as 10 units followed by three zeros giving a total of 10,000pF or 10nF.

A tubular ceramic capacitor is marked 102.J.5 and we decode this component marking as 10 units followed by two zeros which gives 1000pF or 1nF; the J indicates a tolerance of 5% and the voltage rating is 5 volts.

A mylar capacitor is marked 1H473. In this case we disregard the first two marks and read the remaining three in the same way as a disc ceramic capacitor, resulting in this example in a value of 47,000pF or 47nF (an nF, or nanofarad, is shorthand for 1000pF).

Resistors

These are now often plain language coded and use a combination of figures and letters in various orders to denote the value, sometimes with a letter from Table 1 to indicate the tolerance. The first letter in the code is a multiplier and uses R to indicate the position of the decimal point in the value, plus K to indicate a multiplier of 1000 and M for 1,000,000 times. Table 2 gives some examples.

Table 2.

R27M	=	0.27 ohms at 20%
6R8J	=	4.7 ohms at 5%
470RK	=	470 ohms at 10%
2K7F	=	2.7 kohms at 1%
39KM	=	39 kohms at 20%
1M2J	=	1.2 mohms at 5%

Preferred Numbers

Resistors are built in a series of values depending on the tolerance required, in such a way that the minimum amount of stock need be carried to cover all requirements. These are known as the "E" numbers and the most used sequence is probably E12 which runs: 10, 12, 15, 18, 22, 33, 47, 56, 68 and 82. This series, together with the use of multipliers allows any value to be created. For 1% resistors the E96 series is used but, as its name suggests, there are 96 values and that is a bit much to reproduce here.

American Valves

These are still readily available and in very general use, and although we are not going to go in to great detail about them there are some coding marks that will give you some idea as to what the valve is. First we will take the American codings such as 6L6GT. The first thing to realise is that this does not tell you what the valve will do, it simply indicates some physical data about it. The first figure indicates the voltage rating of the filament or heater which in the example is 6.3 volts. Other common ratings were 1(.5), 12,

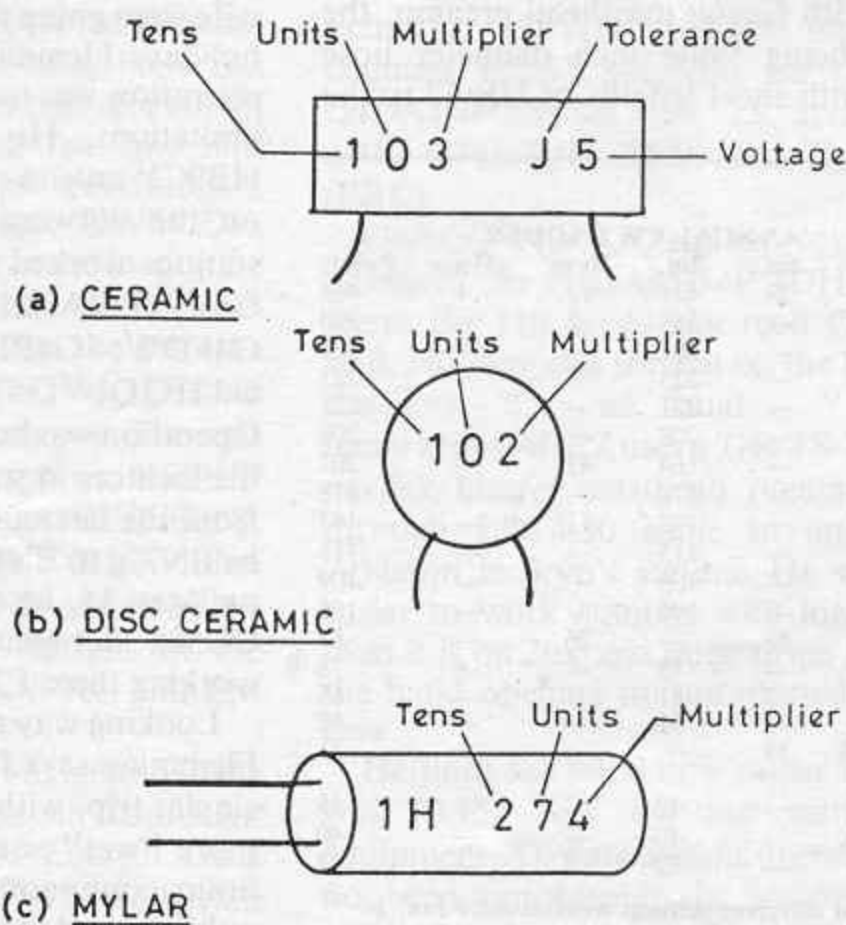


Figure 1

25, 35, 50 and even 117 volts. The letter following this figure gave no information. The next figure frequently conveyed how many elements the valve contained or how many pins were connected at the base of the valve. Thus 6J5 was a 6.3 volt heater with five connections, two for the heater, one for the cathode, one for the grid and one for the anode. It was therefore possible to assume that a type number with 5 in it probably indicated a triode, 6 meant a tetrode and 7 a pentode. The 'G' in our example indicates a glass, rather than a metal, envelope and the 'T' indicates tubular construction instead of the common pear shaped envelope. So 6L6GT indicates a six-volt heated tetrode with a tubular glass envelope.

British Valves

At least the Americans only used one civilian coding system (the military used the JAN numbers which are, in effect, stock numbers and give no information about the valve type) but in Britain all manufacturers used an in-house system some of which were helpful, but most of which were not! Early valve types often carried a coding which told you directly what the valve was, hence DDT4 was a double diode combined with a triode and had a four-volt heater and FC4 was a frequency changer. Of the British makers perhaps the most helpful is Mullard and of their codings you are most likely to find the 'E' codes such as EF39. The 'E' indicates that the valve has a 6.3 volt heater. The final figures are a Series number but the letter or letters between the figures indicate the valve construction and the most common types are shown in Table 3.

Table 3.

A	=	diode
B	=	diodes
C	=	triode
F	=	pentode
H	=	heptode
L	=	tetrode
M	=	magic eye
Z	=	rectifier

Type numbers could use a combination of these letters so that ECH33 would indicate a 6.3 volt heater with a combination of a triode and a heptode, the usual configuration for a frequency changer. The magic eye was a valve with a fluorescent screen mounted on the end of the envelope which was mounted in such a way that it could be seen outside the equipment. A dark segment about 90 degrees wide is produced on the screen when no signal is being received and this angle gradually reduced with the strength of an incoming signal so giving a visual indication of correct tuning.

Transistors

There is a coding system for these and originally it was based on the Mullard valve coding system so that types such as OC45 indicated a zero voltage heater (because there was no heater) and a triode, or three element, construction of emitter, base and collector; these being the equivalent of the valves cathode, grid and anode. The final figures are a development series and provide no information about the device. The other second letter which is commonly encountered is 'A' which indicates a diode construction.

The New System

The system now used consists, usually, of two or three letters followed by a group of figures. Again the figures are a development series and usually contain no information except on types which are intended for industrial applications. The first letter is usually an 'A' indicating that the device is made from germanium or a 'B' indicating a silicon based device. The next letters give an indication of the uses of the device and the more common type letters are shown in Table 4.

Table 4.

A	=	signal or mixer diode.
B	=	variable capacitance diode.
C	=	small signal AF type.
D	=	AF power type.
E	=	tunnel diode.
F	=	small signal RF type.
L	=	RF power type.
N	=	photo-coupler.
P	=	radiation sensitive device.
Q	=	radiation generating device.
S	=	switching device.
T	=	thyristor type device.
U	=	power switching device.
X	=	varactor or multiplier.
Y	=	booster diode.
Z	=	voltage reference (zener).

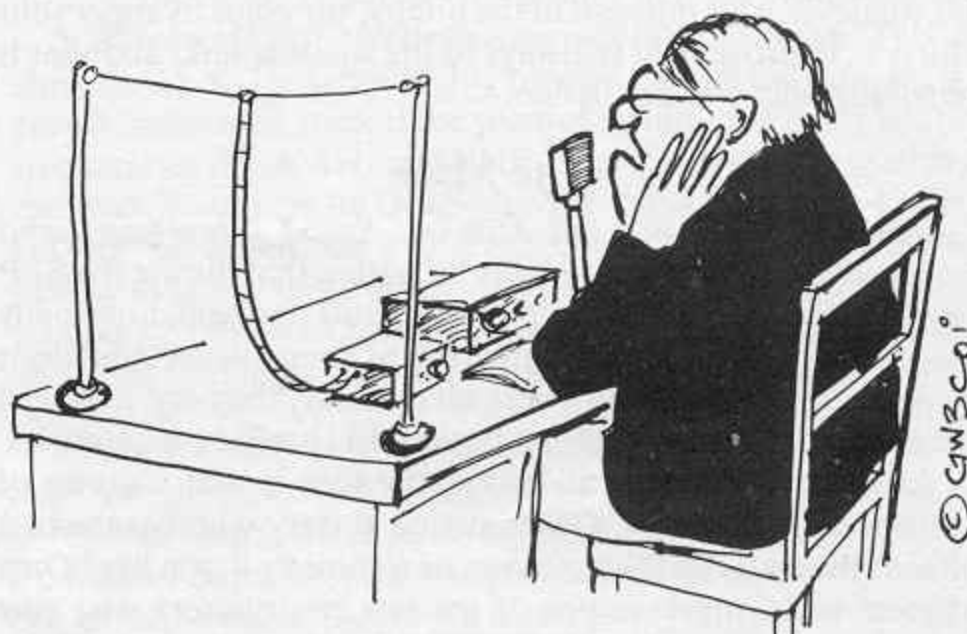
Japanese Transistors

These have a very straightforward coding. The first letter may be 1, 2 or 3 indicating diode, single-gate FET or transistor and dual gate device. The 'S' which follows simply indicates a semiconductor device and the following letter indicates the use of the device according to Table 5. Any numbers following the letters are simply in-house serial development numbers and convey no useful information.

Table 5.

A	=	HF pnp type.
B	=	LF pnp type.
C	=	HF npn type.
D	=	LF npn type.
F	=	p-gate thyristor.
G	=	n-gate thyristor.
J	=	p-type FET.
K	=	n-type FET.

See you next month?



“... a Zepp on two metres — why not? ...”

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

ONE of the often-overlooked aspects of amateur radio — obvious when you say it — is the fact that the station is a *system* comprising a site plus a house plus neighbours plus family, plus one's working hours plus a shack plus an aerial plus a rig, plus a logging system plus an operator's competence; not to mention such other things as the sunspot cycle and its hourly ups-and-downs. All these things must be taken into account if one is to gain the maximum from the station.

For a simple example, the person who spends £1500 on a rig, and then couples it to a Best Bent Wire fed against an earth comprising a four-foot spike driven half-way into the ground and then connected by way of 30 s.w.g. wire to the rig earth terminal is hardly thinking in sensible terms about his station as a system. If one could assume that a budget of £1500 was available, then this amateur would have done better for his money to obtain the highest tower, plus best rotator and beam he can, making an inverted-vee for each of the bands not covered by the beam which it is desired to use, and spending the rest on a basic rig such as an AR88D and KW Vespa Mark 2, which will give as good sensitivity and as much RF output as an expensive rig. Overall the station will be simpler to operate and much more effective.

What we are trying to say is that we must look at all the factors involved, and balance all the options we can visualise, before we set out to uprate our station. It seldom happens at the very beginning of one's SWL or amateur career, because one simply sets off with whatever is to hand. It is when one's interests in amateur radio have, more or less, settled down, that the question really arises.

By then it should be the case that you can get the best out of your receiver, in the sense that whatever the aerial offers it will be resolved if possible; hence, improvements in the aerial system (or earth system if one's aerial is of a type involving use of an earth) are far more cost-effective than buying a new rig. Likewise, when you find yourself running out of new prefixes at your regular operating time, it makes far more sense to change your hours than work on the aerial. If your QSL return rate is poor, it is well to investigate whether one is giving valuable reports before buying a batch of gold-plated six-colour cards to tempt the DX.

What it all really comes down to is that whatever your station, and whatever your interests in the hobby, the place to apply your efforts at improvement is always to the weakest link, and that is something only you can define.

The Mail

Our first letter is from *Mrs. A. Sitton (Stevenage)* who provoked the foregoing thoughts by noting that during the SLP she was a little bored by having to log stuff she would normally tune over. One is inclined to agree, but of course when conditions are down, as they evidently were on that day, then one may well fill in some of the previously un-noticed EU prefixes or countries. As for what the SLP is all about, the idea is that a group of listeners can operate for a given period and see who has the best score at the end. An SWL version of a contest, if you like! On a different tack Angela is one of the few contributors who ever mention any constructional activities, and of course she has been involved in the local club's GB4SNT activity.

I.S.W.L.

Readers will be aware that the old ISWL 'died' a few months back, for various reasons. A group of devoted types has put a lot of time and effort into setting things up once more, and we hope readers will give them as much support as possible. The costs of this re-flotation have been borne by the members of council concerned, a very generous act indeed. Old and new members can join up by writing to ISWL Hq, 10 Clyde Crescent, Wharton, Winsford, Cheshire CW7 3LA. However, it must be noted that everyone starts level in the new set-up, and that the offices of Secretary and Treasurer have been separated. Previous members are asked to mention their old membership number when joining the new ISWL.

All your J.C. can say is that we hope they make a go of it, and that contributions to 'Monitor' should arrive at Hq by January 5. The ISWL QSL Bureau is also back in action, and its address is: ISWL QSL Bureau, 1 Lodge Road, Darlaston, Wednesbury, W. Midlands WS10 7RZ.

The letter from *P. Davies (Market Drayton)* is mainly concerned with the SLP and conditions, as seen by an Eddystone 840A; it sounds as though the receiver has a problem with overloading signals, and some care with the use of the RF gain control or the use of an attenuator at the front-end seems to be indicated.

Mrs. R. Smith (Nuneaton) says she has now got her aerials better arranged, and so it would seem from the list she has put in. Work on aerials nearly always pays off!

Next we have *E. M. Gauci (Sliema, Malta)* who passes the 3000 mark. When your J.C. took over the piece, back in 1966, a score of 1000 was reckoned to be good enough for one to 'retire and give the others a chance!'

Now to *B. F. Hughes (Harvington)* who sent a brief note and listing, with the comment that he had been requisitioned to wave a

ANNUAL HPX LADDER Starting date, January 1, 1986

SWL	PREFIXES
L. Marquardt (Hereford)	453
B. Musselwhite (Warminster)	338
J. Doughty (Cheslyn Hay)	240
D. McGlone (Limerick)	208

200 Prefixes to have been heard since January 1, 1986 for an entry to be made, in accordance with HPX Rules, see p. 339 November issue. At score 500, transfer to the All-Time Ladder, will be automatic. For this year only, those who wish may continue in the Annual Table, provided a separate listing is sent in (where applicable) from the All-Time list. Thus the 1987 final listing, to appear in the March 1987 issue, will show who has heard the most Prefixes in 1986. The listing below is, as indicated in the text, all-mode.

P. Davies (Market Drayton)	1310
E. M. Gauci (Sliema, Malta)	936
F. Dunn (Chester)	910
Mrs. A. Sitton (Stevenage)	758

which is designed for 600 ohms unbalanced — quite unusual. As to what one can do with it, probably it would be usable as a receiver attenuator, although it was almost certainly originally designed for audio or supersonic frequencies rather than R.F. The need is spelt out, "suck it and see!"

P. Oliver (Paisley) says he has had so much rain lately that he is thinking of building an Ark and going /MM. Were he in Mid-Wales he could doubtless entrap one of the trees that have fallen into the river and turn it into a dug-out canoe — no caulking of seams then!

Another one to sent in a listing only is *J. J. Sales (Lancaster)* who takes himself up to 400 in the Ladder.

The reason for the absence of *S. Wilson (St. Andrews)* seems to be personal — like getting involved in a new taxi business which is keeping Stuart amused for the moment. The receiver and the long-wire remain, and still manage to see a spell of use most days.

Our next letter comes from *F. Lees (Dagenham)* who asks about the ferrite rings for use with TV problems, when the TV is causing QRM to amateur reception. The ones your scribe uses are of Mullard origin, which were acquired years ago and of a grade now long obsolete. However I would think that most of the regular advertisers could supply, if you tell them they are for braid-breaker filters or fitting to the TV mains-lead, as the method is fairly common among the licensed amateurs to stop the transmitter RF getting into the TV — all we are doing is to reverse matters! SMC (TMP Electronics) at Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd CH7 3PL is GW3TMP, and he will surely know if one of the Amidon range of rings would answer the case.

Association

Finally, we would like to mention the *International Listeners' Association*, which now has over 100 members. The latest

newsletter has an interesting short piece about the air bands, and includes a handy map of the various designated air lanes, some hints on the sort of receiver to look for, and a list of useful frequencies at HF for those who have general coverage receivers. Get the details on this group from Trevor Morgan, 1 Jersey Street, Hafod, Swansea SA1 2HF, Wales.

The S.L.P.

The entry for this was not very large, even allowing for those who sent in what one might call 'apologies for absence' for good and valid reasons. In addition, the conditions were far from good, and the bands were distinctly noisy. This of course reflects in the logs; nobody with more than one item which might be called 'rare' DX, and everyone having lots of EU and small fry.

This makes it a trifle hard to adjudicate fairly; when the top two have worked a similar number of stations, as did Mrs. A. Sitton and P. Davies, one has to look at other things. Both Angela and Philip wrote an interesting covering letter which made some attempt to analyse what was going on and what the band conditions were like. In fact after a lot of thinking and comparing of logs and letters, we have had to say that these two are joint winners: Mrs. Angela Sitton of Stevenage, and Philip Davies of Market Drayton are joint winners for this time.

Finale

That's it for another "SWL"; the deadline for next time is to arrive by **January 22**, addressed as always to "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime, thanks for all your good wishes for the Christmas and New Year, which are of course heartily reciprocated. May 1987 be a good year for us all, and may the sunspots start to liven things up before long!

CLUBS ROUNDUP

By "Club Secretary"

ONCE more the month's mail. And, this is the moment maybe for us to remind you that the way we handle things is this: whatever reaches us by the deadline is taken in automatically, but if a letter or listing for a given month arrives too late, then it is put in the pile for the next time round. Entries are noted for three months running, and then dropped unless renewed by the club concerned. This is done in order to avoid enquirers possibly being misled as to the club, its venue, or officers, and so lost as new members.

The Mail

Abergavenny & Nevill Hall have their meetings every Thursday evening, in the room above Male Ward 2 at Pen-y-Fal Hospital from 7.30. We understand they have a Morse class first, then a talk, video or whatever.

The second Tuesday in each month is the one to note where **Acton, Brentford & Chiswick** are concerned; the Hq is at Chiswick Town Hall, Chiswick High Road, London.

AMRAC caters for those who are interested in applications of computers to amateur radio, from a room at 'The Crown' pub in Bishops Waltham, Hants. Dates are January 2 and February 6. Details from the Hon. Sec. — see Panel.

Ariel radio group is comprised of the various BBC

establishment clubs, and so caters for all amateur radio and SWL interests. Details from the Hon. Sec. — see Panel.

BARTG will have had their AGM by the time this is read, but for the moment we assume the Hon. Membership Sec. is re-elected, so we refer you to him for details of membership; see panel. BARTG looks after those who are into RTTY or data communications in our bands.

For details of **Basingstoke's** doings we must refer you to the new Hon. Sec. — see Panel.

BATC covers all facets of the amateur TV interest, such as SS/TV, TVRO, fast scan, colour and the rest of it. If you write to the Hon. Sec. — see Panel — please enclose an *s.a.e.*, and help keep the costs down. We could add that it is a good idea to put in an *s.a.e.* when writing to *any* club Hon. Sec.

Downe Village Hall is home to the **Biggin Hill**; we read a hint of a problem in their last letter, so we suggest you get the latest details from the Hon. Sec., at the address in the Panel, rather than just go to the Hq, next door to the 'George & Dragon' in High Street, Downe, Kent, on January's third Tuesday.

Again we must refer you to the Hon. Sec. for details of the **Borehamwood** club, although we can tell you they are at Organ Hall Community Centre, Bairstowe Close, Borehamwood, on the second Monday of the month.

On to **Braintree** for the first and third Monday of each month, at the Community Association, Victoria Street, next to the bus station. There seems to be something set up for every meeting.

At **Bredhurst** they have January 8 for 'Antique Sound Recording', by *Radio Kent*, and a junk sale on 22nd. On Friday 23rd they have their annual dinner and dance. On the other Thursdays of each month they have construction and natter nights. Venue is the Parkwood Community Centre, Rainham, Kent.

Names and Addresses of Club Secretaries reporting in this issue:

- ABERGAVENTNY & NEVILL HALL: J. B. Davies, GW4XQH, 109 Croesonen Park, Abergavenny, Gwent NP7 6PF. (0873) 4655
- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB. (01-992 3778)
- AMRAC: P. Bridges, G6DLJ, 9 Hollydene Villas, Southampton Road, Hythe, Hants SO4 5HU. (0703) 847754
- ARIEL: T. Butler, 333A Bush House, London.
- B.A.R.T.G.: P. & J. Beedie, GW6MOJ/GW6MOK, Ffynnonlas, Salem, Llandeilo, Wales SA19 7NP. (0558) 822286
- BASINGSTOKE: A. Windsor, G1OQU, 28 Mendip Close, Buckskin 2, Basingstoke, Hants RG22 5BP.
- B.A.T.C.: T. Brown, G8CJS, 25 Gainsborough Drive, Adel, Leeds LS16 7PF.
- BIGGIN HILL: R. Senft, G0AMP, Mill Hay, Standard Road, Downe, Kent BR6 7HL. (0689) 57848
- BOREHAMWOOD: Ivor Rosenberg, 11 Parkside Drive, Edgware, Middx.
- BRAINTREE: D. Brades, 3 Coldnailhurst Avenue, Braintree CM7 7SL.
- BREDHURST: K. Fay, G0AMZ, 37 Sandringham Road, Rainham, Kent ME8 8RP. (0634) 376991
- BRISTOL CITY RSGB: C. R. Hollister, G4SQQ, 34 Battersby Way, Henbury, Bristol BS10 7SU. (0272) 508451
- BURTON-ON-TRENT: M. Cotton, G4HBY, Burton-on-Trent 33958
- BURY: M. Sivieri, G4ZTB, 47 Ramsay, Bacup, Lancs.
- CENTRAL LANCs: D. W. Fowler, G4YWG, 22 Larchwood Crescent, Leyland PR5 1RJ. (0772) 432275
- CHELMSFORD: A. C. Mead, G4KQE, 9 Abraham Drive, Silver End, Witham, Braintree, Essex CM8 3SP.
- CHELTENHAM: T. Kirby, G4VXE, 29 Tivoli Road, Cheltenham, Glos. GL50 2TD. (0242) 36723
- CHESHUNT: J. & T. A. Watkins, G4VMR/G4VSL, 'One Ash', Frogs Hall Lane, Haultwick, Herts SG11 1JH. (Dane End 250)
- CHESTER: D. Hewitt, 31 Broadmead, Vicars Cross, Chester.
- CHICHESTER: C. Bryan, G4EHG, Marmanet, Salthill Road, Fishbourne, Chichester, Sussex PO19 3PZ. (Chichester 789587)
- CHILTERN: C. Dunn, G4KVI, 24 Mynchen Road, Beaconsfield, Bucks.
- COLCHESTER: F. R. Howe, G3FIJ, 29 Kingswood Road, Colchester. (0206) 851189
- CORNISH: N. Pascoe, G4USB, Bosuathick Farm, Constantine, Falmouth, Cornwall. (Falmouth 40367)
- COVENTRY: W. Hahn, G3UOL, 91 The Chesils, Coventry CV5 9NA. Coventry (0203) 414684
- CRAWLEY: D. L. Hill, G4IQM, 14 The Garrones, Worth, Crawley, W. Sussex RH10 4YT. (Crawley 882641)
- CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. (01-699 6940)
- DARTFORD HEATH D/F: A. R. Burchmore, G4BWV, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
- DERBY: J. Anthony, G3KQF, 77 Brayfield Road, Littleover, Derby DE3 6GT. (0332) 772361
- DOVER (SE KENT YMCA): J. Saueressig, G0ADK, 8 The Ridgeway, Dover. (Dover 823226)
- DUNFERMLINE: D. Young, GM0DYD, 4 Primrose Avenue, Rosyth, Fife KY11 2SS. (0383) 413440
- EDGWARE: J. Cobby, G4RMD, 4 Briars Close, Hatfield, Herts. (Hatfield 64342)
- EXETER: R. Donno, G3YBK, 8 Mincinglake Road, Exeter EX4 7EA. (0392) 78710
- FALKIRK: G. L. Leishman, GM4MCB, Woodside, Redding, Falkirk, Stirlingshire FK2 9UQ. (0324) 715624
- FAREHAM: A. S. Chester, G3CCB, 'Deva Wood', 44 The Ridgeway, Down End, Fareham, Hants. (0329) 288139
- FELIXSTOWE: P. J. Whiting, G3YQC, 77 Melford Way, Felixstowe IP11 8UH.
- FYLDE: H. Fenton, G8GG, 5 Cromer Road, St. Anne's, Lytham St. Anne's, Lancs FY8 3HD. (Lytham St. Anne's 725717)
- G-QRP: Rev. G. C. Dobbs, G3RJV, St. Aidans Vicarage, 498 Manchester Road, Rochdale, Lancs OL11 3HE. (Rochdale (0706) 31812)
- GRAFTON: J. Kaine, G4RPK, 74 Camden Mews, London NW1 9BX. (01-267 1000)
- GRIMSBY: T. Matthews, G3RGC, 38 Foxhill, Wybers Wood, Grimsby, South Humberside DN37 9QL.
- HARROW: D. Atkins, G8XBZ, 25 Maxwell Close, Rickmansworth, Herts. (0923) 779942
- HASTINGS: D. Shirley, G4NVQ, 93 Alfred Road, Hastings, Sussex. (Hastings 420608)
- LINCOLN: Mrs. P. Rose, G4STO, Pinchbeck Farmhouse, Mill Lane, Sturton-by-Stow, Lincoln LN1 2AS. (Gainsborough 788356)
- LOUGHTON: D. Thorpe, G4FKI, 44 Townfield Road, Flitwick, Beds MK45 1JF.
- MAIDSTONE YMCA: P. Martin, G0BUW, address wanted. Tel: (0622) 30544
- MALTBY: K. Johnson, G1PQW, 20 Rolling Dales Close, Maltby, Rotherham, Yorks S66 8EJ. (0709) 814135
- MIDLAND: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham B32 1LB. (021-422 9787)
- NENE VALLEY: M. R. Byles, G6UWS, 108 Kingsway, Wellingborough, Northants. (Wellingborough 71189)
- NORFOLK (Coll. of Arts & Technology): E. Haskett, G4OZG, 23 Gloucester Road, Gaywood, Kings Lynn PE30 4AB. (0553 768701)
- PLYMOUTH POLY: K. Taylor, G4ZTZ, Amateur Radio Society, Students Union, Plymouth Polytechnic, Drake's Circus, Plymouth PL4 8AA.
- PONTEFRAC: C. Mills, G0AAO, 27 Pendennis Avenue, South Elmsall, Nr. Pontefract, W. Yorks. (0977) 43101
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- R.A.O.T.A.: Sylvia Havard, G4USN, 'Altonswood', 1 Merricks Lane, Bewdley, Worcs DY12 2PA. (0299 403163)
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- SOUTH ESSEX: A. Smith, G4FMK, 8 The Parkway, Canvey Island, Essex SS8 0AA. (0268) 683805
- SOUTHGATE: D. C. Elson, G4YLL, 200 Churchgate Road, Cheshunt, Herts EN8 9EL.
- SOUTH LAKELAND: R. Pearce, 72 Queen Street, Dalton-in-Furness, Cumbria LA15 8EH.
- SPEN VALLEY: I. F. Jones, G4MLW, 54 Milton Road, Liversedge, Heckmondwike, W. Yorks. (Heckmondwike 409739)
- STEVENAGE: F. Wilson, G4ISO, 15 Byrd Walk, Baldock, Herts SG7 6LN. (Baldock 892765)
- STOURBRIDGE: C. S. Williamson, G1HEB, 7 Hanbury Hill, Stourbridge DY8 1BE.
- SURREY: J. Simkins, G8IYS, 18 Riding Hill, Sanderstead, Croydon CR2 9LN. (01-657 0454)
- SUTTON & CHEAM: G. Plucknett, G4FKA, 32 West Road, Malden Rushett, Cheshington.
- TIVERTON: A. Smith, G1OYO, Box 3, Tiverton, Devon EX16 6RS.
- TODMORDEN: Mrs. V. Mitchell, G1GZB, Parrock Farm, Shore Green, Todmorden, W. Yorks OL14 8SF. (Todmorden 7572)
- TORBAY: B. Wall, G1EUA, 48 Pennyacre Road, Teignmouth TQ14 8LB. (Teignmouth 78554)
- VERULAM: G. Wimpenny, G4OBH, 30 Faircross Way, St. Albans. (St. Albans 52003)
- WACRAL: L. Colley, G3AGX, 'Micasa', 13 Ferry Road, Wawne, Nr. Hull, Yorks HU7 5XU.
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- WORTHING: R. Jones, G4SWH, P.O. Box 599, Worthing, W. Sussex BN14 7TT. (Worthing 208752)
- YEOVIL: E. H. Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW. (0935) 75533
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

It's AGM time for **City of Bristol** on January 26, at the Small Lecture Theatre, University of Bristol, University Walk, Clifton, Bristol.

Every Wednesday evening we find the members of **Burton-on-Trent** at Stapenhill Institute; there are various talks and activities going, including D/F, and the club station G3NFC is often on the air.

Now **Bury**, where they have every Tuesday at the Club Room, Mosses Community Centre, Cecil Street, Bury. At least one meeting each month is a formal with a talk, video or film show.

No details are to hand on **Central Lancs**, but we are told they have the first and third Monday at Priory Club, Broadfield Drive, Leyland.

The **Chelmsford** group is nested up at Marconi College, Arbour Lane, where on January 17 they have the club Social; January 6 is a nice settling film show after the festivities.

The **Cheltenham** club is based on Stanton Room, Charlton Kings Library. Try the first and third Fridays of each month.

The **Cheshunt** crew seems to be happy in their Hq at Church

Room, Church Lane, Wormley, every Wednesday evening. They seem to have an activity of some sort most weeks.

When we look at **Chester** we find them at the Chester Rugby Union FC, Hare Lane, Vicars Cross. The AGM is on January 6, and the construction contest winners give a talk on Tuesday 13th. What happens on the remaining Tuesdays we don't know but we do note the odd informal date in past months.

It's the first and third Tuesday for **Chichester** at North Lodge Bar, County Hall, Chichester, at 7.30 p.m.

Now **Chiltern**, where the gang foregathers at the Science Block, Sir William Ramsey School, Rose Avenue, Hazlemere, High Wycombe; the second Wednesday is a natter night and the fourth Wednesday lecture night.

Deadlines for "Clubs" for the next three months—

February issue — December 29th
 March issue — January 29th
 April issue — February 26th
 May issue — March 26th

Please be sure to note these dates!

On January 22 and February 5 the **Colchester** group makes its way to Colchester Institute, Sheepen Road, in the Staff Common Room. More details from the Hon. Sec. — see Panel.

The **Cornish** Hq is the Church Hall, Treleigh, on the old Redruth by-pass; the meetings details were being settled at the time of their letter.

The home of the **Coventry** group these days is at Baden-Powell House, 121 St. Nicholas Street, Radford, Coventry, where they are to be found every Friday evening.

Turning to **Crawley**, they are to be found at Crawley Leisure Centre on the second and fourth Tuesday; the former is an informal and is usually at a member's home, so we recommend a call to the Hon. Sec. — see Panel — to check.

Over to **Crystal Palace** who should be easy to find; their Hq is opposite the IBA mast, in All Saints Parish Rooms, Beulah Hill, London SE19, on the third Saturday in the month.

Now **Dartford Heath D/F**; they have no events in January, and for the February details we must refer you to the Hon. Sec. — see Panel for the needful.

At **Derby** the New Year kicks off with a junk sale on January 7, and on 14th they have a 'Year in Retrospect' session. January 21 is constructors' contest night. In general, they meet on Wednesdays at 119 Green Lane, Derby, where they have the whole of the top floor.

The group centred on Dover is known as **SE Kent (YMCA)** because they meet at Dover YMCA, Godwynehurst, Leyburne Road, Dover, every Wednesday evening.

Up now to **Dumfermline** where the new Hon. Sec. — see Panel for his details — would be pleased to hear from you and tell you about the club and its activities.

At **Edgware** the routine is to meet on the second and fourth Thursday of each month at 8 p.m., at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. January 8 is the AGM, and 22nd an informal.

Down west now to **Exeter**, where the locals are to be found on the second Monday of each month at the Community Centre, St. Davids Hill, Exeter, starting at 7.30 p.m.

It's the first and third Wednesday for **Falkirk** at Grange Centre, Brightons, near Falkirk; more details from the Hon. Sec. — see Panel.

Back to the south coast now to **Fareham** and their base at Portchester Community Centre, Westlands Grove, Portchester, Hants. January 7 is a natter, and on 14th G3TZL is Morse testing. January 21 is AGM, and on 28th they have a 'Satellite Update' from G6HXR.

Felixstowe has a social evening at Hq on January 13, and a visit to Ipswich Hospital Radio on January 16. The Hq is at 'The Feathers' pub, Walton High Street, Felixstowe.

The subscription at **Fylde** includes membership of the Kite Club at Blackpool Airport where they have their meetings on the first and third Tuesday; January 6 is the AGM.

If you are into home-brew and QRP operating, then the one for you is the **G-QRP Club**; get all the details from the Hon. Sec. — G3RJV's details are in the Secretaries Panel.

At **Grafton** the membership is gradually picking up again after the move to new Hq at *TS Wizard*, White Hart Lane, close by Haringey Football Ground, London. Meetings are on the second and fourth Friday, and the room they meet in is on the left of the main corridor. Bus W3 stops outside, or look for talk-in on 144.825 kHz.

January 8, 15, and 22 are the given dates for **Grimsby**, the middle one being for construction, and the other two are talks. For details of the venue and times, please contact the Hon. Sec. — see Panel.

To find the **Harrow** group, you must find Harrow Arts Centre, and then the Roxeth Room therein. Any Friday will serve.

The main meeting at **Hastings** is on the third Wednesday at West Hill Community Centre. However you can find the gang informally nattering at Ashdown Farm Community Centre every Friday evening.

The **Lincoln** venue is the City Engineer's Club, Central Depot, Waterside South, Lincoln LN5 7JD. January 7 and 21 are activity nights, while on January 14 G1TSL will talk about 'Fire and Smoke'. January 28 is for G4XFC who will talk about fibreglass techniques in everyday use.

The club at **Loughton** has its Hq at Loughton Hall, Rectory Lane, Loughton, Essex. Contact the Hon. Sec. for more details.

The **Maidstone YMCA** chaps meet at the YMCA Sports Centre, Melrose Close, Maidstone, Kent, every Friday evening.

January for **Maltby** shows them to be in session on January 2 for an activity night-on-the-air, and on 9th listening to a talk on building a multimode transmitter for Top Band. January 16 is for contest organisation and operating, and on 23rd there is a talk on computers in amateur radio. Finally, on January 30 they have a talk on a VHF/UHF absorption wavemeter. All are at the Community Centre, Clifford Road, Hellaby, just off M18 Junction 1.

Meetings of the **Midland** club are now at Unit 5, Henstead House, Henstead Street, Birmingham, on the third Tuesday in every month.

The **Nene Valley** members are to be found at the 'Prince of Wales' pub, Well Street, Finedon, where they get together every Wednesday evening; they seem to alternate informals with lectures, films or whatever.

The **Pontefract** crowd is now on the ground floor of Carleton Community Centre, rather than the top floor, to make it easier for disabled members to attend. January 8 is the AGM, and on 15th they have a film show. January 22 is the annual junk sale, and on 29th they have a committee meeting.

To find the **Powys** club you get on the B4386 from Montgomery to Chirbury, and just before you leave the built-up area of Montgomery, turn eastwards down a private road, for almost a mile, avoiding sheep and watching for a very sharp turn, and you will find Lymore Park Cricket Pavilion, where they meet every Thursday evening.

Moving Again!

We gather that for some time past the group based on **Norfolk College of Arts & Technology (Kings Lynn)** has been in the doldrums; but now things are picking up, a programme is in being, new members have joined, and new ideas are being looked at. They are to be found every Thursday evening at the radio shack, rear of St. James' Boys School, Hospital Walk, Kings Lynn.

Next **RAIBC**, and it is quite astonishing to look at the cover of their *Radial* and note the proliferation of the RAIBC nets nowadays; and since RAIBC full members are all invalid and

blind this is a very good thing. Of course, they still want supporters, representatives and funds! Get all the details from the Hon. Sec. — see Panel.

Next we turn to **RAOTA** and this one is for the Old-Timers, who have more than twenty-five years in the hobby. Again, details from the Hon. Sec. — see Panel.

The **Reading** crowd is to be found on January 6 and alternate Tuesdays thereafter, at the 'White Horse' public house, Emmer Green, Reading. Programme details are being put together and we are promised details later.

On the third Thursday of each month you can find the **Solihull** group at Shirley Centre, Stratford Road, Shirley. Start time is 7.30 p.m. and the past detail given indicates they have something set up for each meeting.

When we turn to **South Bristol** we find they have their programme all tabulated, to include room number, venue, date, and organiser; Thus January 7 is using Rooms 1-2-3-4 at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol BS14, for a lecture, while on January 14 G1SFS is i/c VHF activity evening in Rooms 1-2-3. January 21 is a photographic activity evening in Rooms 1-2-4, under W. Pipping. This seems a thriving and active club, and the change of rooms shows they are growing, too.

The **Southdown** main meeting is held on the first Monday of each month at Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne; but in addition they are to be found at the Clubrooms, Wealden District Council Office, Vicarage Field, Hailsham, on Tuesdays and Fridays.

Every Wednesday, The Paddocks in Canvey Island is invaded by lots of radio amateurs heading for the **South Essex** club meetings.

Holy Trinity Church Hall (Upper) is the home of the **Southgate** club of which your scribe was a member some thirty years ago; now they have the second Thursday of each month and still manage to get a good programme together.

South Lakeland is based on the Norweb Sports & Social Club, at the rear of the Ormsgill Hotel, Barrow-in-Furness, and they are keen to recruit new members and see visitors. Find them on the first and third Thursday of each month.

The **Spenn Valley** membership card is a rather engaging fluorescent red this year, and on it we see they are due for a talk on rifle shooting by G4IPH on January 8; January 21 sees G6DLA talking about the development of sound recording. Meetings are Thursdays at Old Bank Working Men's Club, Mirfield.

The Hq for the **Stevenage** group is Electronics Room 1, SITEC Ltd., Ridgmond Park, Telford Avenue, Stevenage. The group gets together on the first and third Tuesday of each month, but our programme runs out at the end of December, so we can't bring you further up to date. You could either turn up, or contact the Hon. Sec. — see Panel — for more details.

Sad to say we can't tell you the **Stourbridge** January programme because our copy of the newsletter was smudged in precisely the wrong place — sorry, all! We can say they are at the Robin Woods Centre, School Street, off Enville Street, on first and third Mondays each month.

Now **Surrey** and this means *TS Terra Nova*, 34 The Waldrons, South Croydon, and again the first and third Monday of which the first is a formal, with talk or whatever, and the other one the informal chat session, with club station and teapot both at work.

January 5 and 16 are the dates for **Sutton & Cheam**; the former is a natter in the bar, and the later date is the formal. Both are at Downs Lawn Tennis Club, Holland Avenue, Cheam. Notice that the January 20 is a Friday, and that G4XRU will talk about conversion of CB sets.

Over to **Thames Valley** where they have their base in Thames Ditton Library, Watts Road, on the first Tuesday of the month.

For details of **Tiverton**, we must refer you to the Hon. Sec. — see Panel.

Looking at the **Todmorden** details, we find they use the Queen Hotel, Todmorden as their base, on first and third Mondays. More details from the Hon. Sec. — see Panel.

Alternate Fridays and Thursdays at 7.30 p.m. it is for the weekly **Torbay** sessions, at ECC Social Club, Ringslade Road, Highweek, Newton Abbot, Devon. In addition there is the monthly business meeting at the same venue on the last Saturday in the month; this meeting usually includes a talk or video or tape-and-slide talk. More details from the Hon. Sec. — see Panel.

On the second and fourth Tuesday of each month the R.A.F. Association Hq in New Kent Road, off Marlborough Road, St. Albans, is invaded by **Verulam** members. Again details on the January doings from the Hon. Sec. — see Panel.

WACRAL is the club which caters for the practising Christian radio amateur or SWL; they get together by way of an annual 'do' and, of course, regular HF and VHF nets, not to mention their newsletter. Details from the Hon. Sec. — see Panel for his details.

At **Wakefield** the reduced size of the newsletter print gives the old eyes a bit of trouble, but we see January 6 as a brains trust, and January 17 the annual dinner. January 20 poses the question, "What am I doing in Amateur Radio?" and the venue is the Community Centre, Prospect Road, Ossett.

Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington, is the home, every Tuesday evening of the **Warrington** crowd. January 6 is an open forum, and on 13th they have GW3PRA who is giving a talk on "All at Sea with Electronics!"

Move

Welwyn-Hatfield are now taking their main meetings at Lemsford Village Hall, Brocket Road, Lemsford, on the first Monday of each month. Informals on the third Monday are still at 9th Welwyn Garden City Scouts Hq, Knightsfield, Welwyn Garden City. January 5 is a CW practice night and January 19 a construction evening, starting the club project.

The new **Wigan** set-up is to be found at St. Jude's Club, Poolstock Lane, Wigan, at 8 p.m., and we gather a programme is being set up. More details from the Hon. Sec. — see Panel.

Wimbledon has a social evening on January 9, at 7.30; venue St Andrews Church Hall, Herbert Road, Wimbledon. The routine dates are the second and last Fridays at the address given unless otherwise notified.

Ivy Farm, Arrowe Park is the Hq of **Wirral** society, and they are to be found there on the first and third Wednesdays of each month.

Once again for **Worcester** we have to refer you to the Hon. Sec. — see Panel — although we do know the Hq is at the Oddfellows Hall, New Street, Worcester on the first and third Monday each month.

Woodhouse Inn, Woodend, Rhodesia, is the Hq of the **Workshop** crowd. January 13 is a 'Duff Present Sale' (!) and on January 27 they hear G4SHU doing his talk on home brew solid state.

Wednesday meetings at **Worthing** are not in Worthing but Lancing Parish Hall, South Street, Lancing.

For January, **Yeovil** have a natter night on 1st and 29th. January 8 is G3MYM on 'The Transmission Line Equation' and 15th gives the same speaker a chance to show how aerial gain is produced. January 22 is G3GC's talk and demonstration on soldering techniques. All are at the Recreation Centre, Chilton Grove, Yeovil.

Finally **York** where the Friday evenings are at the United Services Club, 61 Micklegate, York. This club is very keen on outside events, and so they are quieter at this time of year, but they are a friendly lot who love having visitors. Give them a look in!

Finale

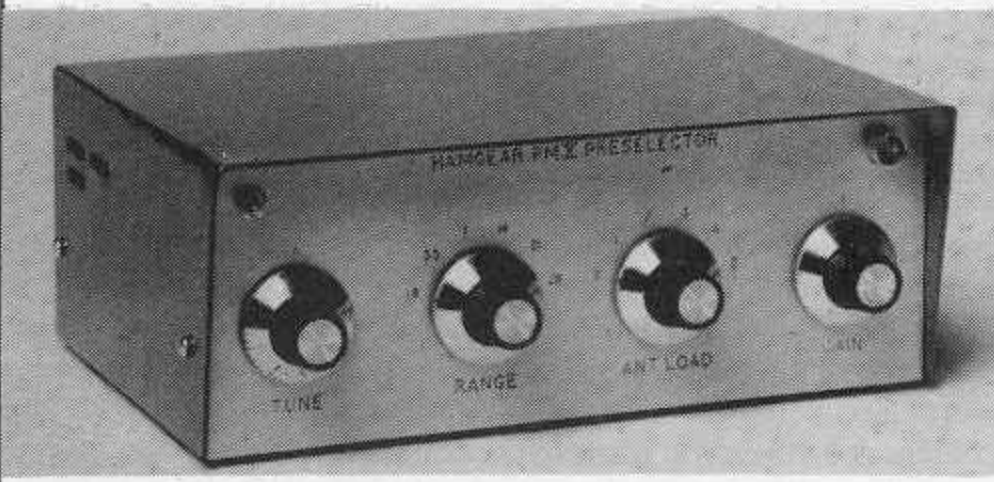
We've found the bottom of the pile again, and the time has come to mention deadlines — They are in the 'box' in the body of the piece and are the dates for arrival of your letters, addressed to your "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts, AL6 9EQ. 'Bye now!

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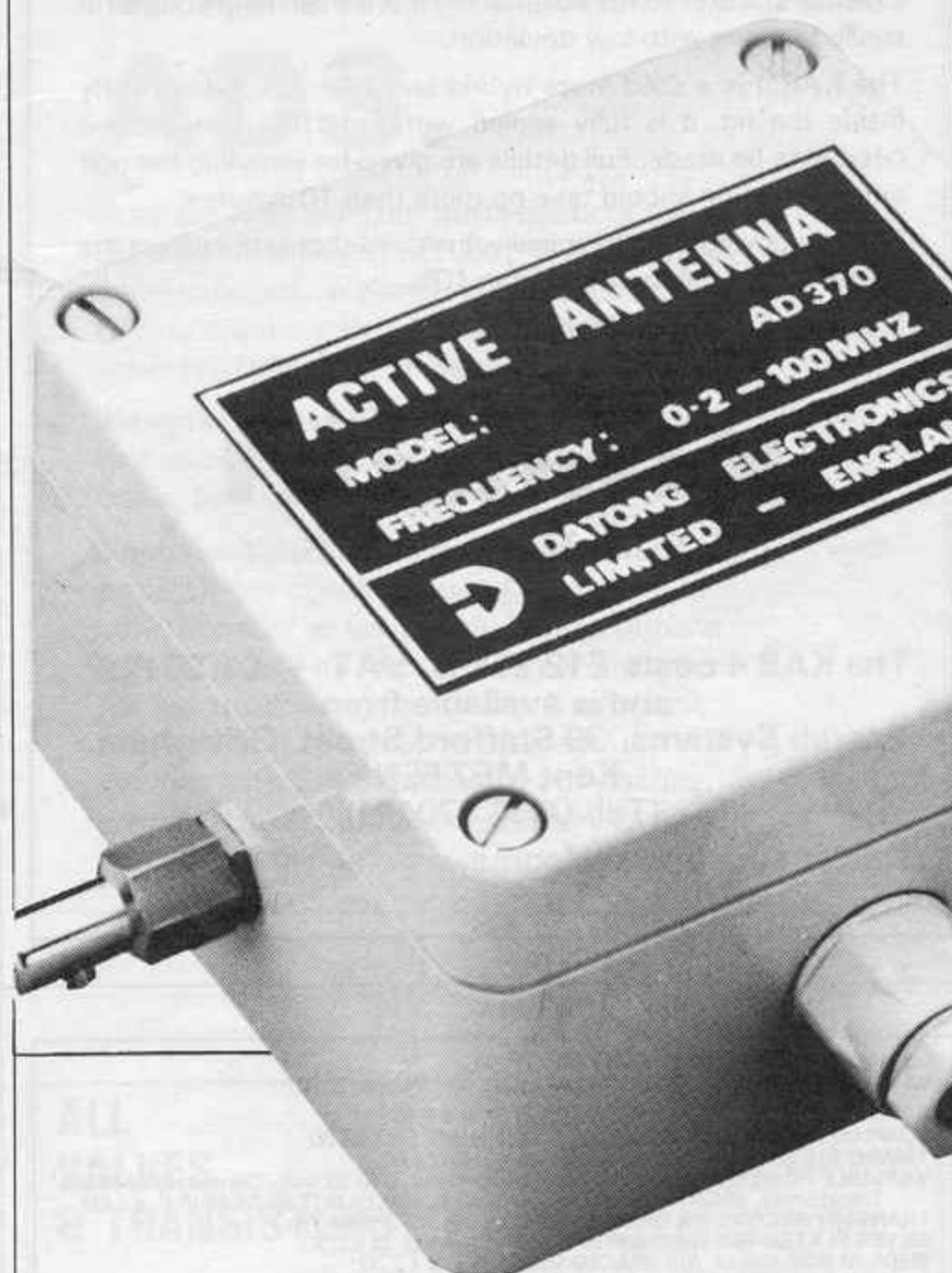
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Wanted: Eddystone 770R receiver covering 19-166 MHz (or any Rx which has that coverage). — Page, 34 Belgrave Crescent, Chichester, West Sussex. (Tel: 0243-783651).

Wanted: Eddystone loudspeaker, good price paid. — Ashcroft, G4CJL, Rose Cottage, Southmead Lane, Henstridge, Templecombe, Somerset BA8 0RJ. (Tel: 0963-63357).

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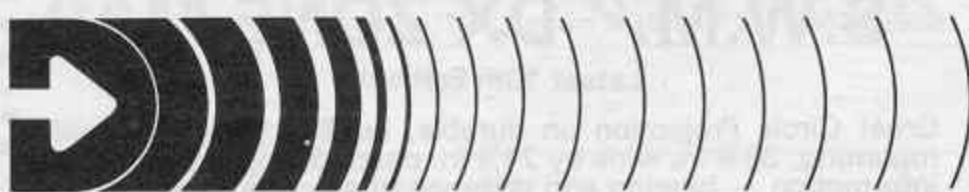
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Wanted: List of pre-W.W.I radio amateurs and first experimental licence. Any old knobs! War-time and pre-war copies of *Radio Times*. Very old wireless books, magazines and catalogues. — Byrne, G3KPO, QTHR. (Tel: Ryde (0983) 67665).

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