The SHORT WAVE Magazine

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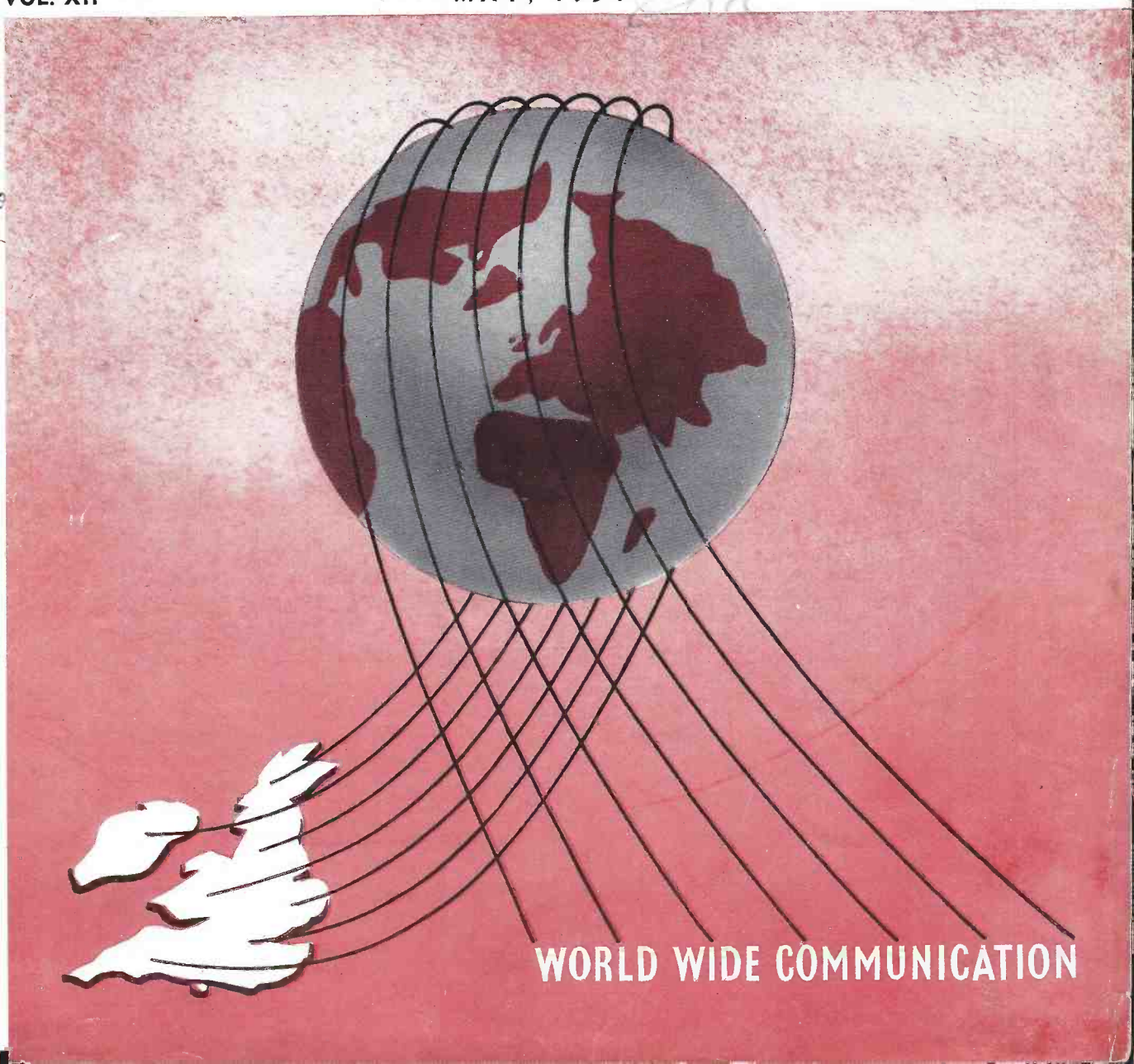
VOL. XII MAY, 1954 NUMBER 3



WORLD WIDE COMMUNICATION

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SHORT WAVE MAGAZINE

VOL. XII MAY 1954 No. 129

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The SHORT WAVE Magazine

EDITORIAL

Solution? *One of the great problems confronting those concerned for the future of Amateur Radio is that of "catering for the beginner." Where does a boy find the simple stuff to start him on the right road? Not in* SHORT WAVE MAGAZINE*—nor, we venture to say, in any other similar publication in the English language.*

Why is this? The answer lies in that simple but compelling phrase "Cost of Production." There are never enough beginners to justify, in the commercial sense, a publication intended specially and entirely for them—yet that is what they need, and what is wanted. If a beginner-periodical is offered its cover price (by reason of the relatively small circulation, low advertising interest and high production cost) immediately puts it beyond the reach of most beginners, who are mainly juniors in low-paid employment or schoolboys with limited pocket-money. Thus, a beginner-periodical (for any subject with a technical flavour, radio or anything else) must be heavily subsidised. Apart from this, anyone with practical experience of technical journalism knows that dealing with technicalities in simple language is a great deal more difficult than writing a technical article for informed readers. There are thousands of qualified technicians who can write a high-level technical article—but very few who can say the same thing in simple language. There has only been one Sir James Jeans.

The correspondence we get bearing on this problem is illuminating to a degree. On the one hand, it is quite clear that many readers would not accept any lowering of technical standards to meet the needs of the beginner; on the other, there are the SWL's (who are really "advanced beginners") who say that we are already above their heads and beyond their reach in the technical sense.

Both these opposing view-points are equally justified. The answer would seem to be a section of SHORT WAVE MAGAZINE *devoted to the interests of the SWL and the beginner—from the ground up. But this means one of two things: Either cutting space devoted to existing features, or increasing size. The former course raises obvious problems and difficulties, and the latter must inevitably mean an increase in cover price.*

The problem has been with us for years. The solution is as far off as ever.

Austin Forbes G6FO.

Top Band Trans-Atlantics, 1954

SURVEY OF RESULTS IN THE FOURTH POST-WAR SERIES

L. H. THOMAS, M.B.E. (G6QB)

Again we are happy to present the results in detail of the important Top Band DX Tests recently concluded. Already the fourth in our post-war series, the history of these Tests, as an organised undertaking, goes right back to 1938, when SHORT WAVE MAGAZINE *arranged the first 160-metre Trans-Atlantic attempt open to all who cared to participate. As well as the noteworthy contacts achieved by a large number of G's, an outstanding feature of the post-war series of Tests has been the increasing appearance on the Top Band, year by year, of many interesting DX stations in addition to the VE's and W's. The report following is set out in such a way that all who took part this season can check on the conditions, and the results obtained by others, during the sessions for which they came on. And once again, we have to thank Stewart S. Perry, W1BB, for the time and effort he has given to the organisation of the Tests on, and the reporting of results from, the W/VE side.—Editor.*

ALTHOUGH this series of tests has proved somewhat disappointing from the point of view of stations in the U.K., it has been extremely interesting in the broader, world-wide sense. Stations not handicapped by our 10-watt power limitation have covered some phenomenal distances; more countries than ever before have been active; and once again all six continents have come into the picture.

As a series of International Tests they have succeeded beyond all doubt—but they have left most of our struggling 10-watters with the feeling that "the flowers are not for you to pick."

Quite apart from the power aspect, it seems that the northern latitudes have not been favoured by conditions; even the path between the U.K. and the States was not so good, on many occasions, as the more southerly path to the West Indies and Central America. On the American continent, North-South contacts proved numerous and relatively easy, but from the U.K. no such contacts are available apart from the opportunity provided by the very enthusiastic and consistent CN2AO in Tangier.

In between the organised week-end tests, several noteworthy contacts were made, and we will try to make this a true record of events in their chronological order.

Warming Up

It would seem that the season was opened in November, 1953, by a few stray contacts between G's and W's, although the band was never wide open. On December 6, however, G5JU (Birmingham), had a really good session and worked W1BB, 1DBE, 1LYV, 1TMA, 1VDB, 2EQS, 2GGL, 3RGQ, 9PNE and VE2WW. On the same morning VE1EA worked G3PU, 5RI and 6GM, and heard G5JU and GW3ZV. The season was officially "on"!

On the following Sunday, December 13, SWL R. Iball (Worksop) heard W1BB, 1VDB, 2GGL and 3EIS, and W1BB worked G5JU around 0600.

First Test, December 2. This one opened with a bang. Conditions were good, and right from the first second, at 0500 GMT, DX was heard all over the band. More than a score of W's and VE's were getting across (*see* Table I), and the other DX included KV4AA and VP7NM. On this side, apart from the U.K. stations, outstanding signals were going out from CN2AO, EI9J and HB9CM, all making contacts with ease. CN2AO and HB9CM gave several W's two new countries.

W1BB and GC3EML heard each other and had a kind of half-contact, one side or the other being spoiled by QRM and QSB, so they did not claim this as a "first," which it would, otherwise, have been.

WØNWX was active, and raised KV4AA and VP7NM, but found it impossible to work DX in the 1830-1870 kc segment, on account of Loran interference.

On Christmas morning the Channel Islands came into the picture again, when GC2CNC and W2QHH made what now appears to have been an incomplete QSO. The RST report was missed at one end, due to QRM. There has been considerable controversy and correspondence about this, but the eventual verdict seems to be that as this (like the W1BB/GC3EML affair on December 20) was not a

complete contact in the accepted sense of the word, the vacancy for the first GC/W QSO was not filled. The GC2CNC/W2QHH affair was noteworthy for QRP at both ends, '2CNC's input being only 4½ watts.

December 27. This Sunday morning, although not marked down for an organised test, proved to be another good one. Some 30 North American stations were heard over here, and at least 10 Eurpeans were heard (most of them worked) on the other side.

OH3NY was listening and heard nine W's; WØNWX worked CN2AO for his first African and therefore, presumably, the first African contact with WØ on 160 metres.

The W9's and Ø's were plagued by Loran again, and W1BB made a broadcast to the effect that DX stations wanting to contact them should call on 1805 kc. A few such contacts were then made.

January 2 appears to have been another good morning, and a noteworthy success fell to G3PU (Weymouth), who made the first G/VP7 contact by raising VP7NM. This took place at 0720 GMT. On the same morning W3RGQ made history by working VR2BJ. Very little other activity was reported.

Second Test, January 3. Conditions took a dive on the previous day, and this test took place on a very poor band. Outstanding signals reported from the other side were GW3ZV and EI9J; others getting across were G3PU, 5JU, 6CJ, 6BQ and 6QB. A notable contact was made between W1BB and G2HKU (Sheerness)—notable because the latter was using only a 66 ft. aerial and a power of 5 watts.

DX stations active on this occasion were CN2AO, KV4BB and VP7NM. On this side the most successful scorer was G5JU, who worked KV4AA, VE1EA and about nine W's.

Tests by W1BB on the relative merits of horizontal and vertical aerials (but not with a "Kytoon" this time!) indicate that a good horizontal is still the best.

We now appeared to have passed the peak, and from early January onwards we never regained the good band conditions that prevailed in December.

Janu ary10. This Sunday was spoilt, for the Americans, by terrific static. Nevertheless, a large number of stations were active, and a welcome newcomer to the arena was KZ5DE (Canal Zone). Stations making contacts from this side with the North Americans were CN2AO, G5JU, 5RI, 6BQ and 6GM.

General notes of interest at this stage in the proceedings are that WØNWX had, by now, worked 15 countries in 5 continents—W, VE, G, GW, EL, KV4, KP4, KG4, CN2, XE, VP4, VP7, ZL, KH6 and KC6! Three more countries, apart from that list, had been worked by W9NH, to wit, CO, LU and VP9. Four stations (W3RGQ, WØAPF, ØFIM and ØIPH) had worked VR2BJ.

Nothing more is noteworthy until the morning of Saturday, January 16, when G3PU scored another very nice "first," with KZ5DE, who also worked several W's. HC1KV showed up for this session, and worked W9NH, 9PNE, ØFOG and ØNWX — but no East Coast stations.

TABLE I

DATE	DX STATIONS WORKING EUROPE	OTHER DX HEARD IN EUROPE
Dec. 6	W1BB, 1DBE, 1LYV, 1TMA, 1VDB, 2EQS, 2GGL, 3RGQ, 9PNE, VE1EA, VE2WW.	
Dec. 13	W1BB.	W1VDB, 2GGL, 3EIS.
Dec. 20	W1BB, 1EFN, 1LYV, 1VDB, 2AMC, 2GGL, 2WC, 4KFC, VE1EA.	W1AHX, 1ZL, K2ANR, W2JIL, 2MCU, 2TRK, 2WC, 3FWF, 3RGQ, 3TBG, 9EWC, KV4AA, VP7NM.
Dec. 27	W1BB, ONWX, VE1EA.	1AHX, 1LMU, 1LYV, 1UJP, 1VDB (phone), 1ZL, 2AMC, K2ANR, W2HEY, 2JIL, 2KV, 2QHH, 2WH, 3EIS, 3HL, 3PA, 3RGQ, 4COL, 4KFC, 5ANO, 8GDQ, 8HQ, 8IKN, 9CZT, 9PNE, ONWX, VE2AIE.
Jan. 3	W1AQE, 1BB, 1DBE, 1UJP, K2ANR, 2BWR, W2EQS, 2GGL, 2QHH, 2WH, 3EIS, 3RGQ, 4KFC, VE1EA, KV4AA, KV4BB.	W1DBE, 2AMC, ONWX, VE1EA, VP7NM.
Jan. 10	W1BB, VE1EA.	K2ANR, W2GGL, 2WC, 2WH, 3EIS, KZ5DE.
Jan. 16	W2QHH, KZ5DE.	W1VDB, 2EQS, 2WWP, 3RGQ, ONWX.
Jan. 17	W1BB, 1BMW, 1LYV, 1ZL, 2EQS, 2GGL, 2PP, 2UKS, VE1EA.	W1LYV (Phone), 1QCA, 2AMC, K2ANR, 2BWR, 2HCW (Phone), 2JIL (Phone), 2WC, 3EIS 3HL, 3PA, 3RGQ, 4BRB, 4POB, 4KMS, 8EJL, 9CZT, 9NH, 9PNE, VE2AIE, KP4KD, KV4AA, KV4BB, VP7NM.
Jan. 24	W1BB, VE2AIE.	KZ5DE, VP7NM.
Jan. 31	KV4AA, KP4KD.	W1BB, 2GGL, 2QHH, 3HL.
Feb. 7	KP4KD.	
Feb. 14	VP7NM, VE1EA.	
Feb. 28	W2EQS, VE1EA.	W1BB, 2GGL, 2WC, 4KFC, KP4KD, KV4AA, VP9BDA.
Mar. 14	KP4KD, VP4LZ.	W1BB.

Third Test, January 17. Conditions for this one were only fair, but activity was considerable on the European side. Stations getting across included G2PL, 3PU, 6BQ, 6QB, 8JR, GC3EML, GW3ZV, CN2AO and EI9J. A humorist calling himself ZC6BB hardly succeeded in deceiving anyone.

KP4KD showed up from the other side, KV4AA and 4BB were both active, and VP7NM continued to keep the Bahamas on the map. ZS3K was being called by W's, and at least three East Coast stations (W1LYV, 2HCW and 2JIL) were heard on phone.

Sunday, January 24, saw plenty of activity, although not an official test morning. G5JU worked W1BB and VE2AIE, KZ5DE and VP7NM were very active, and W1BB worked W6KIP/6, located in Death Valley, Calif., 282 ft. *b.s.l.* (below sea level !). The latter runs a 600 ft. wire, but still thinks it is " not a very good place for 160 metre DX." He is trying to interest XE2OK in the band.

Fourth Test, January 31. This seems to be the first of the mornings on which the path swung southwards from Great Britain and gave much better reception from the West Indies than from any part of the States or Canada. So poor was the normal path that W1BB reported hearing EI9J weakly, but nothing else. KV4AA, down where the band was good, worked EI9J, G6BQ and CN2AO. VP7NM and KP4KD were busy working W's, and another newcomer, VP6EB, put in an appearance. He raised a few W's and most of his neighbours in the Caribbean.

On this same morning W3RGQ and 8GDQ both had QSO's with ZL3RB—a clear indication that something had happened to conditions.

KP4KD worked EI9J and G6BQ for another couple of " firsts," incidentally making it his *sixth* band with them both ! EI9J describes KP4KD as " the star signal " on this occasion.

February 7 was the occasion of another " non-scheduled test " and conditions were still of the " down South " variety. GD3UB succeeded in working KP4KD this time, and W1BB reports that GD3UB was the only signal audible over there, at RST 119/339. KP4KD worked KZ5DE, three W8's, three W9's and one W6 on CW, also raising W2QHH and 8GDQ on phone. He was using 100 watts to a quarter-wave aerial, and was bothered with a very high local noise level.

Fifth Test, February 14. This was where things really started tailing off. So much so, in fact, that the only report sent in from this side came from EI9J, who found VP7NM the best signal and worked him. A few W's were also heard by EI9J, and G6BQ appears to have been received very weakly in the States, but otherwise the only contacts made seem to have been between the W's and VP7NM and KP4KD, with Europe right out of the picture.

W3RGQ heard KP4KD and VP9BDA ; VE1EA worked VP7NM and G6BQ, and heard KZ5DE.

Just to show that it was only the North Atlantic path that was really poor, W9PNE worked ZL3RB on February 13 and again on February 15. On the latter day W8GDQ's *phone* was received at S6 by ZL3RB ! Several other W's were making contact around this part of the year, the time usually being between 0800 and 0930 GMT.

On February 21, with very poor conditions prevailing, KP4KD was again active, and VP4LZ put in his first brief appearance. Not a single signal from this side was heard in America. Two days later, on February 23, VE1EA raised VP4LZ fr his first South American contact.

Sixth Test, February 28. This was almost a complete washout, largely owing to QRN on the other side, which was S8-9 in many areas. Quite a number of DX stations were audible on this side, but the reverse did not apply, and the only Trans-Atlantic contacts logged were W2EQS/HB9CM, CE1EA/GW3ZV, and W2EQS/GW3ZV. North-South work was easier, and, as an example, W1BB worked KP4KD, KP4UE, KV4AA, VP9BDA and VP9BF.

On March 7 there was plenty of activity on the other side, but no European DX was heard by anyone. However, the W's did not find it dull, since a new DX station showed up in the person of KH6MG. Working on 1994 kc, he contacted a long string of W's—mostly 9's and Ø's, but including also W1BB, 3RGQ, 5WEH and 8ANO.

Final Test, March 14. And so we reach the last lap—another very poor one for G stations. Static was again troublesome on the other side, and the path that was really open was still too far south for any G/W contacts. However, EI9J took advantage of the southerly path to work KP4KD, and, later, VP4LZ, whose signals were S7 in Eire that morning. EI9J says that VP4LZ came on KP4KD's frequency (1880 kc) and the latter asked him to QRX for EI9J. A fine QSO resulted, which would not have occurred but for KP4KD, since the VP4 knew

nothing about the tests and was not listening on 1850 kc, where EI9J was hiding out.

We think this was the first European contact with South America ; certainly it was the first with VP4, and puts EI9J at least in the running for a 160-metre WAC !

VP4LZ also worked a long string of W's, VE1EA and the KP4's. He is in favour of continuing the tests until May, as North-South conditions remain favourable long after the East-West path has died. (This year the death seems to have occurred late in January !)

Summing-Up

There is no doubt that this season was the best yet *for the North Americans.* There was more activity than ever before, more countries on the air, more contacts. But for us in Europe it was far from successful. After the early bout of good conditions in December and January, things settled down to a uniform dullness.

The combined effect of the bad conditions and the exceptionally severe weather experienced in the U.K. during February cut the activity down to a very low level, and the logs sent in almost to *nil.*

Had it not been for W1BB's unceasing activity on the other side, and the arrival of his most informative bulletins week by week, we really should not have known what was going on, because so much of the activity on the other side was hidden from us by the poor conditions.

Even if we had been allowed to use 150 watts on the Top Band, it is doubtful whether things would have been easy, because on many mornings only one or two W's were audible here in spite of the high level of activity over there.

Acknowledgments

We wish to thank all those who sent in logs and accounts of their own successes, and to congratulate those who *did* succeed.

Also a hearty word of thanks to the senders of " check logs," particularly G3CED (Broadstairs), G3GVA (Calne) and SWL's R. H. Jeakings (Luton), J. L. Hall (Beckenham), N. C. Smith (Petts Wood) and R. Iball (Worksop).

Finally, as ever, a particular word for Stewart Perry, W1BB, for bearing the brunt of the whole thing and for his tireless work in keeping the activity stirred up. If a Top-Band Medal is ever struck, Stew shall certainly be the first recipient—in the meantime, the sincere thanks of ourselves and all G's for his magnificent co-operation.

TABLE II

DATE	EUROPEANS WORKING DX STATIONS	OTHER EUROPEANS HEARD BY DX
Dec. 6	G3PU, 5JU, 5RI, 6GM.	GW3ZV.
Dec. 13	G5JU.	
Dec. 20	G3PU, 6GM, 6QB, GC3EML, GW3ZV, EI9J, HB9CM.	
Dec. 27	G3BKF, 3ERN, 3PU, 5JU, 5KM, 5RI, 6BQ, 6GM.	G2HKU, 3HVX.
Jan. 3	G2HKU, 3PU, 5JU, 6BQ, 6CJ, 6QB, GW3ZV, EI9J.	G3BKF.
Jan. 10	G5JU, 5RI, 6BQ, 6GM.	
Jan. 16	G5JU.	
Jan. 17	G2PL, 3PU, 6BQ, 6QB, 8JR, GC3EML, GW3ZV, EI9J, HB9T.	G5JU, 6GM.
Jan. 24	G5JU.	
Jan. 31	G6BQ, EI9J.	
Feb. 7	GD3UB.	
Feb. 14	G6BQ, EI9J	
Feb. 28	GW3ZV, HB9CM	
Mar. 14	EI9J.	

Next Season

We have already agreed upon the dates for next year, and, to take advantage of the possibility of good conditions throughout December, we propose to start early. The Sunday mornings set aside for organised tests are therefore **December 5 and 19, January 2, 16 and 30, and February 13.** If conditions are found to be good as late as mid-February, then we can always have an unofficial extension. It *has* been known for conditions in March to reach a higher peak than in previous months—but not this year !

So note the above dates, pray for good conditions, and we will see you next season.

SPRING CALL BOOK

The Spring Edition of the *Radio Amateur Call Book* includes a G Section of no less than 22 pages, giving the call-sign/addresses of nearly 8,000 licensed amateurs in the U.K. These lists include all QTH's and changes of address as published in our " New QTH " feature up to and including the February 1954 issue of *Short Wave Magazine.* As usual, the latest edition of the *Call Book* is available in two parts—complete, at 27s. post free ; or less only the American listings, at 10s. post free. Delivery from stock, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Tripler for Seventycems

USING THE 8012 ON 430 MC

R. REW (G3HAZ)

This interesting practical article deals not only with the construction of a tripler for the 70 cm band—capable of producing more than the usual amount of RF output power, and using a valve which is readily available—but also with the HT-less modulation condition. This has been found to give particularly good results on the 430 mc band. In this application, the tripler is fully driven and modulation is applied to the driver stage, but without direct HT on the plate of the output tripler. The result, believe it or not, is a more fully modulated carrier, with much better speech quality, than with the tripler operated in the normal manner with HT on. Attention was first drawn to this phenomenon in "VHF Bands" in our December, 1953 issue.—Editor.

DURING October of 1952 the writer brought into operation on 70 cm a tripler employing a CV127 double disc seal triode. This valve was fitted into a cumbersome and rather laboriously constructed double coaxial line system, the valve working as a common grid power tripler. The input circuit, a shortened quarter-wave coaxial line between cathode and grid, was tuned to 2 metres by an externally mounted air trimmer and condenser. The outer tube of the high potential end of this line protruded into the earthy end of the grid/anode line of some six inches diameter, and formed its inner conductor. Two tuning discs mounted on opposite sides of the grid/anode line tuned it into the 430 mc band. A rotatable coupling loop mounted on a modified Amphenol socket extracted the 70 cm RF from this line, and so up to the aerial. The unit was first driven from the 832A in the 2-metre transmitter, the drive requirements for the thing being such that when this valve was replaced by an 829B, the tripler was still quite prepared to swallow up all the drive that even this valve could provide !

Just before the final assembly of the unit was due to take place, a visit was received from G3BKQ, who showed great interest in it—so much so, in fact, that he left G3HAZ already mentally collecting the brassware necessary for fabrication of a similar unit.

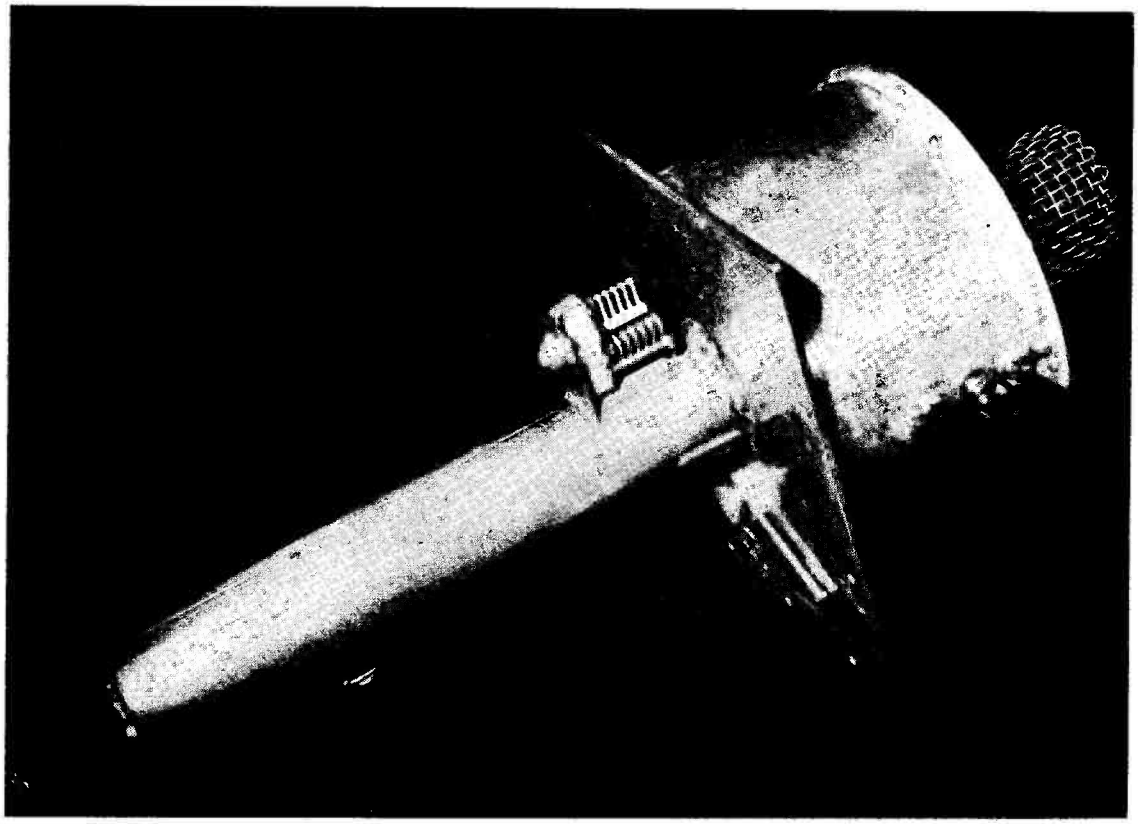
The Mk.I and Mk.II* Triplers

The following day during a test with G3BKQ the tripler was duly fired up for its first test on 70 cm, and from the word "go" received a gratifying RST-579 report from Leicester. As all previous attempts to get across this 40-mile path using modified Type 105 Units had met with no success, G3BKQ of course was now even keener to have a go and see what he could do. Sure enough, it was not very long before he announced he had the tripler well under way, but being unable to obtain a CV127 was busily engaged in "converting" an 8012 by fitting it with an anode disc and a grid sleeve *a la* CV127. The writer said nothing but had visions of shortly being the recipient of a parcel of unwanted brassware complete with disposal instructions !

But much to his relief and rather to his surprise a contact ensued a few nights later on 70 cm with a jubilant G3BKQ at the other end extolling the virtues of the 8012 as a tripler to 70 cm. As far as the writer could ascertain, G3BKQ seemed a little better off for 70 cm RF than yours-truly at this stage of the proceedings !

Thus the Mk.I and Mk.I* versions of the CV127/8012 70 cm Triplers came into being, and the 12 months following saw these units in almost daily use, suffering many prolonged contacts on 70 cm between G3HAZ-G3BKQ. The path always seemed to be open for phone working now that we had reliable transmitters capable of putting some 10 watts or so of RF into the feeder. During this period various points came to light on the behaviour of the units. G3BKQ found that in order to extract the maximum amount of RF from the output line, he had to use a very large output coupling loop ; he was also of the opinion that in the grid/anode line there was more RF than we were managing to obtain by means of our output loops. It was noticed on both units that the coaxial cable feeding the 2-metre drive to the grid/cathode coaxial line tended to develop "hot-spots" at various points along its length. Obviously, a considerable standing-wave existed, due presumably to incorrect matching into the tripler input circuit—this in spite of a variable tapping arrangement to the centre of the line.

At G3HAZ after some six months of operation the CV127 showed signs of decreased power output, rather more than usual colour



Tripler stage as originally used in the G3HAZ 70-centimetre transmitter, employing a CV127. This design was subsequently adopted by G3BKQ, using an 8012. The article describes a later 430 mc tripler — compare the other photographs — using an 8012 in place of the CV127.

on the plate and a tendency to give somewhat inferior speech quality, coupled with large downward kicks on the grid meter. Substitution of the one and only spare brought things back to normal once more, but alas ! only a few more months elapsed before this valve likewise became even poorer than the original CV127 ; the latter was dusted and pressed back into service once again.

HT-less Phone

About this time it was suggested, one evening, that the writer should remove the HT lead from his tripler, earth it, and carry on as before, but modulating the 829B 2-metre driver only. This was done, with the surprising result that the same signal report was received from G3BKQ, with 100% modulation *and* much better speech quality into the bargain ! A similar experiment at the Leicester end resulted in practically the same S-meter reading and a decided crispening of the speech at the G3HAZ end. Better still, the removal of HT from the triplers allowed much cooler running of the CV127 and 8012 anodes, with a drop in power output that was almost negligible.

At G3HAZ in the meantime, with further CV127's at the right price non-existent, thoughts were being turned to the use of an 8012 in a mechanical arrangement rather far removed from the Mk.I and Mk.I.* versions. The Mk.II prototype for a 70 cm tripler was under way.

Tripler Mk.II

The prototype was built to ascertain just how some aspects of the radically different design would work out in practice, before settling upon the final job described here, devoid of all unnecessary frills, adjustable elements, unwanted holes and so on inherent in all first designs. The Mk.II differs from the earlier models as a result of lessons learnt whilst handling and trying out experimental alterations to these earlier designs and by paying closer attention to circuit requirements of a

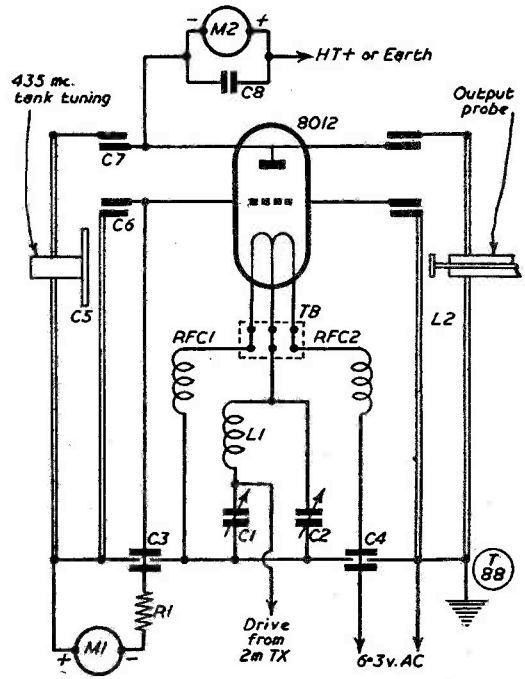


Fig. 1. Electrical cross-section through the 70-centimetre tripler, showing also the circuit arrangement. L1, C1, C2, comprise the 2-metre tuning assembly.

valve operating under these conditions.

Fundamentally, the design is based on the following observations:

(1) The unit was expressly designed to be used with an 8012 valve, since it is robust, is a good performer and is in fairly plentiful supply on the surplus market. Insertion and removal of the valve was made as easy as possible consistent with efficiency of operation and maintenance of good electrical contact to the twin anode and grid pins.

(2) It was now realised that the use of a coaxial line on the input circuit of a grounded-grid stage was wasted effort. The low input impedance effectively reduced the high Q of the coaxial line to a low value, and in any case it was desirable to have a low impedance cathode circuit to keep down the negative feedback occurring across this circuit by virtue of the grounded grid operation. The Mk.II input circuit was therefore arranged as a Pi-network coil and condenser circuit resonant at 145 mc, matching the 70-ohm input cable to the input impedance of the common grid stage. When correctly tuned up, this was found to have practically eliminated the previously mentioned hot spots on the input cable.

(3) There seemed little point in having an output line of 3.6:1 or optimum "Q" ratio, when the "Q" of a line having, say, a ratio of 1.3:1 was still quite adequate for use as the tank circuit of the tripler. Other considerations also influenced the change to this rather low line impedance of 15 ohms.

Table of Values

Fig. 1. Electrical cross section through Tripler Mk.II.

C1	= 50$\mu\mu$F preset, 0.015" spacing	R1	= 25,000 ohms, 10 watts wirewound
C2	= 15$\mu\mu$F preset, 0.045" spacing	L1	= 3 turns 12 SWG copper, silver plated, ¾" internal diameter, wide spaced
C3	= Grid rod by-pass, approx. 100$\mu\mu$F (*see text*)	L2	= 3" and 4" tubes forming 435 mc tuned line
C4	= 500$\mu\mu$F micadisc	RFC1, RFC2	= 36 turns 18 SWG Enam. copper, 3/16" internal diameter
C5	= Grid/anode line tuning capacity	M1	= 0-30mA meter
C6	= Grid condenser, approx. 450$\mu\mu$F	M2	= 0-100mA meter
C7	= Anode capacity, approx. 300$\mu\mu$F	TB	= 3-way, 5 amp porcelain connector
C8	= 0.01μF disc ceramic		

(4) The "stalk" formed by the threaded rod of the tuning discs had been found to possess appreciable inductance at 435 mc, so much so, in fact, that the Mk.I* would tune up quite merrily with one disc, the other disc being screwed right in so that it shorted to the inner line! The use of the lower impedance line obviously led to considerable reduction in length of rod behind the tuning disc—only one being now employed.

(5) Tests with a probe type of output coupling device had shown great promise on the Mk.I. Very little reactance was "thrown back" into the line (as opposed to a coupling loop), but it was still possible, even with the far-from-ideal field of the high impedance line, to extract appreciable power. The use of a 1.3:1 line ratio resulted in a more intense field suited to probe coupling.

(6) Mechanically, as far as disposition of the drive circuit and fitting of the 8012 was concerned, the use of 3 inch and 4 inch diameter coaxial tube for the output line fitted the bill very nicely. The 2-metre side of things were grouped together on the bottom cover plate, the 8012 filament connections attached and the whole assembly neatly stowed away inside the bottom of the 3-inch tube.

General Construction Details

Circuitwise the Tripler Mk.II is shown in Fig. 1, an electrical "cross-section" through the unit. Fig. 2 shows a dimensional cross-section through the 435 mc section with an 8012 *in situ*. The 2-metre drive enters through the coaxial fitting and is applied to the 8012 heater centre tap *via* the Pi-network L1, C1 and C2 resonant at 145 mc. Chokes RFC1, and RFC2 keep the heater at RF potential while allowing the normal transmitter 6·3 volt heater supply (one side earthed) to be used. It was originally thought that condensers from each heater lead to the centre tap would help to ease the drive requirements, particularly as the centre tap is a rod going to the far end of the valve where the two bifilar filaments, one from each outer lead, are terminated. In point of fact two small mica condensers first tried *reduced* the drive appreciably, while two

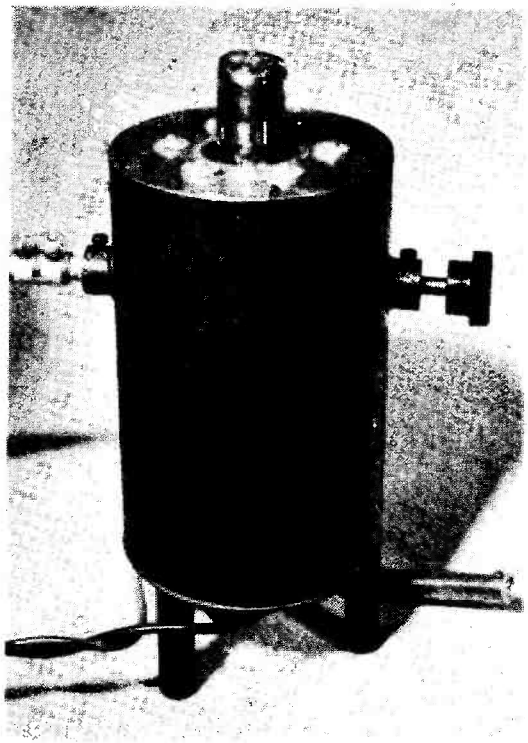
disc ceramics made little or no difference, so were dispensed with.

The 2-metre drive circuit components are all mounted on the bottom cover plate, the photograph showing the arrangement, complete with an 8012 with grid and anode connectors ready to be inserted into the inner tube of the grid/anode line.

The DC grid connection is brought out by means of a rod fitted with a springy contact at one end which engages the head of one of the grid ring fixing screws. The other end of this rod goes through a by-pass condenser C3 consisting of two 1″ brass discs (the inside one is shaped to clear the 3″ tube) and appropriate mica insulation tightly clamped through the bottom cover plate and providing a rigid mounting for the rod. The grid resistor R1 is mounted externally as it dissipates a full 10 watts at 20 mA grid current.

The 3-way porcelain connector block provides a convenient anchor point between the 8012 filament leads on one side and RFC1, RFC2 and the flexibile lead from the Pi-network circuit on the other. Incidentally, the heat travelling down the filament leads should not be under-estimated, neither should any form of soldered connection be made at this point, nor should the connector block be grasped firmly between thumb and forefinger after dismantling the unit immediately following a long natter on 70 cm. It's liable to be rather hot ! It is suggested that a few insulating beads be run on to the 8012 filament centre tap lead to prevent any accidental shorting to either of the filament leads proper.

The grid and anode pins of the 8012 are fitted with small brass connectors fixed by two short 10 BA screws to the pins. These connectors engage small spring clips (fashioned from the fuse carrier clips of a Belling-Lee twin fuseholder) which are soldered to the grid and anode condenser plate rings. Good electrical contact is thus ensured for the grid and anode of the 8012 while the mechanical contacts help to take heat away from the seals and dissipate it in the two condenser plate rings. Fig. 4 shows the component parts of the condenser assemblies. The grid capacitor rings are cut away as shown in order that the 8012 anode grid connectors may pass through to the gap at the top of L2, when a small clockwise rotation of the 8012, clips it firmly in position. The top plate of the grid/anode line is made from 0·004 inch phosphor bronze sheet, though possibly 0·005 inch hard copper or brass would do equally as well. The small amount of flexibility thus permitted takes up any expansion



General appearance of the new G3HAZ 430 mc tripler, using an 8012. Full constructional details are given in the text.

or misalignment and allows the 8012 to sit comfortably in position with little or no strain on its grid and anode pins. The material for the insulating bushes should be capable of withstanding the heat generated at this point and in the writer's case these are machined from high grade bakelite rod. Mycalex or Tufnol should be equally suitable.

The measured values of the grid and anode condensers are 450 $\mu\mu$F and 300 $\mu\mu$F respectively, the lower capacity of the latter, in spite of its greater surface area, being attributed to the slacker clamping against the flexible diaphragm. Slight changes of capacity during transmission cause no detuning in view of the large swamping effect compared with the valve grid/anode capacity of but 2·8 $\mu\mu$F.

The length of the grid-to-anode line has been made such that in conjunction with the stray capacity present, a tuning condenser of approximately 1 $\mu\mu$F is necessary. It is practically impossible to come out other than in the 70 cm band, the condenser size being such that it cannot tune to 290 mc neither does the length of line permit of tuning to 580 mc. The tuning

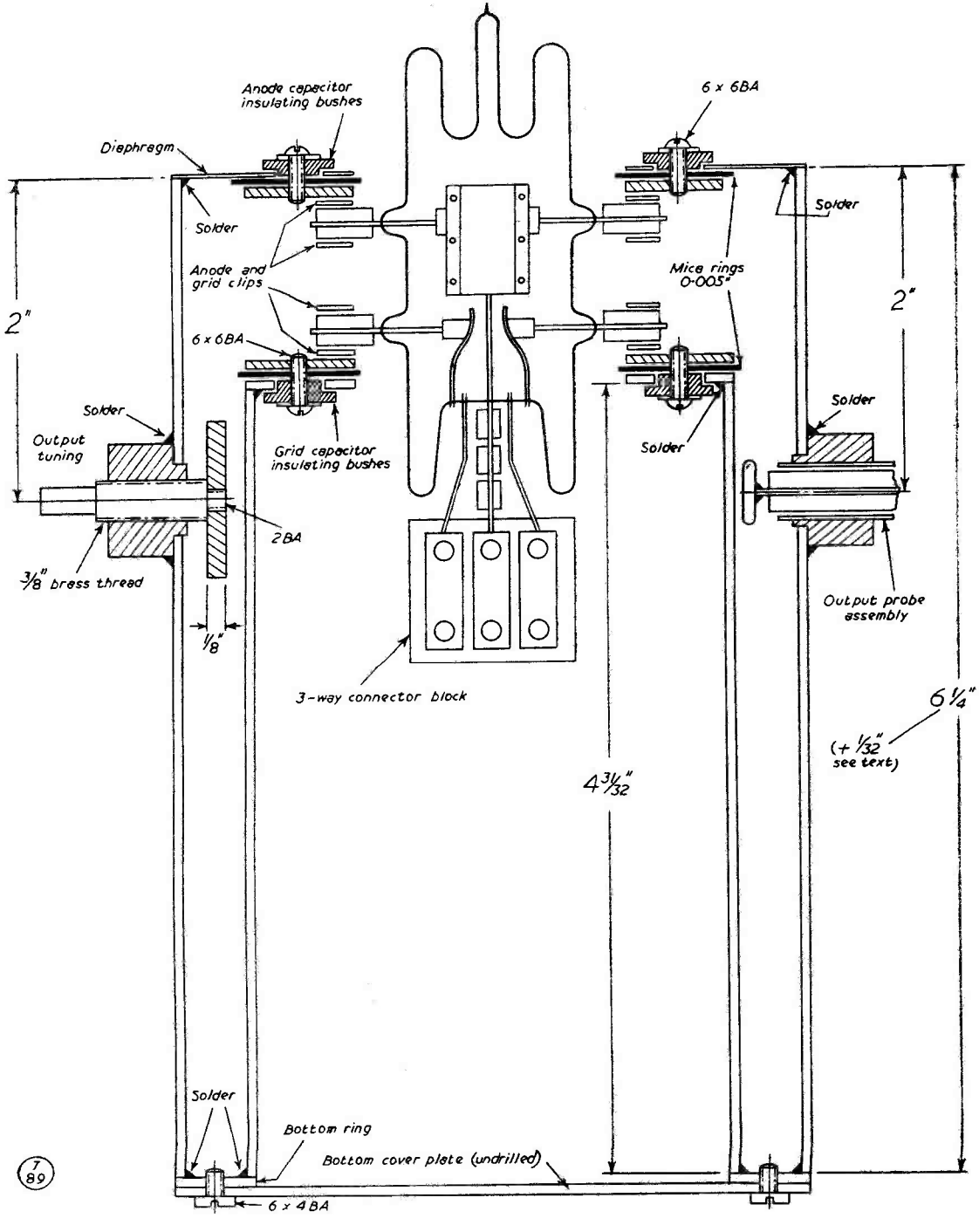


Fig. 2. Dimensioned cross-section through the 430 mc circuits in the G3HAZ 8012 tripler.

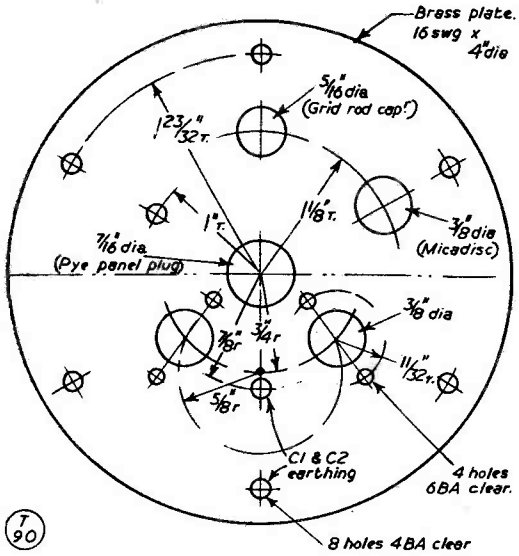


Fig. 3. Some accurate metal work is called for in the construction of the 430mc tripler. This is the drilling template for the bottom cover plate.

capacity C5 consists of a 1″ diameter by $\frac{1}{8}$″ thick brass disc with a centre hole tapped 2 BA. The shaft is made from 5/16″ or $\frac{3}{8}$″ brass rod threaded preferably with a fine brass thread of appropriate size or BSF. The condenser end of this rod is reduced to 0·185″ for a length of $\frac{1}{8}$″ and threaded 2 BA, the other end being reduced in size to $\frac{1}{4}$″ for the tuning knob. Two brass bushes of dimensions shown are mounted on either side of the outer tube of the line, one threaded for the tuning disc shaft, the other with approximately $\frac{3}{8}$″ centre hole for the output probe.

The use of a small lathe is practically essential for the construction of the anode and grid connectors, the two brass bushes, the tuning condenser rod and the insulating bushes for the grid and anode condensers (Fig. 5). As the enthusiasm of the usual VHF-UHF type generally knows no bounds this should not present any difficulty. An approach through the local model engineering channels will almost certainly find a willing fellow complete with all the tools of his trade placed at your disposal—and if all such fails, there is always a good garage or small machine shop where they would do the work for you for a few shillings. The copper or brass tubes and other pieces of brass should be within the scope of the average amateur workshop with its files, tank cutter, hole saws, and so forth providing good use is made of ruler and set square. If not too sure of the accuracy of your measurements it is a good plan to leave the 4″ tube abut 1/16″ longer than is suggested and file to size before the last soldering operation.

Assembly

Once all the brass and copper ware is to hand ready cut to size assembly is mainly a case of a few hours with the XYL's gas cooker and/or the junior op.'s bunsen burner. A piece of aluminium plate $\frac{1}{8}$″ or $\frac{1}{4}$″ thick and about 5″ or 6″ diameter is a great help in the soldering operations, while plumbers' blacking will help prevent the flow of solder other than where it is wanted. The tubes should be given as good a polish as possible before commencing operations, particular attention being paid to the inside of the 4″ and the outside of the 3″ tube. Suggested procedure is then as follows:

Paint the plumbers' blacking over the "fixed" grid condenser plate to with 3/32″ of its outside edge on one side and place on top of the aluminium plate. Carefully position the 3″ tube on the plate and light up. When hot enough run the minimum amount of "Arax" solder round the joint from inside the tube and allow to cool off.

Using similar technique the bottom ring is then soldered to the other end of the 3″ tube (the XYL's damp dishcloth placed on top will prevent too much heat getting to the first made joint). When this joint is solid the 4″ tube should be added, carefully positioned, and the gas relit for the final phase of this part of the proceedings. The solder must be craftily introduced down the space between the tubes for this joint, taking care not to touch the sides

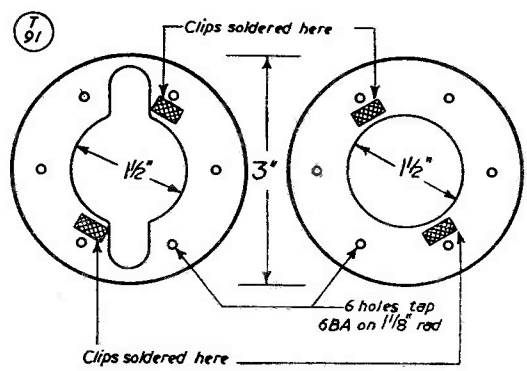


Fig. 4. Dimensions of "loose" grid and anode condenser plates, C6, C7 in the sketch at Fig. 1. Use 16g brass, and make the fixed ring for C6 to the same pattern but drill the 6 holes out to 3/8in. dia. for bushes. For C7.the diaphragm is to the same drilling as the right-hand sketch but is to 4in. dia. with six 3/8in. holes for bushes; material is thin phosphor bronze or hard brass. In both cases, the mica dielectric for C6, C7 is cut to the same dimensions as these plates, but with a sixteenth overlap and holes to clear 6 BA.

and spill unwanted solder thereon. A good idea is to feed the solder down a short length of brass tubing, or else to insert a ring of cold solder at the base of things before lighting up. When cool the whole should be rinsed out thoroughly with boiling water and a brush to remove the corrosive decomposition products of the "Arax" solder. The inside of the assembly should then be given another good clean with brass polish and any surplus solder removed, the next soldering operation being to "put the lid on things," so to speak.

Next, a trial fitting of an 8012 should be undertaken to see how things line up so far and remove if needs be some of that extra 1/16" with a file—if you left it on in the first place. To this end the "loose" plates of the grid and anode condensers are fitted in place, complete with mica, on the end of the 3" tube and the top diaphragm respectively, and an 8012 carefully positioned. The aim should be to get the diaphragm as near flat as possible without any signs of twist or buckling. When satisfied that things are in order the 8012 should be accurately centred up and a scriber run round the outside of the 4" tube to mark a circle on the diaphragm. A mark should also be made so that the diaphgram and tube can be lined up in exactly the same position again (without the valve) for soldering.

The two brass bushes should now be pushed into the 4" tube and the tuning capacitor disc and rod firmly assembled. During the soldering the mica and "loose" disc of the anode condenser are tied with wire against the grid condenser. The aluminium plate is brought into action for the last time and the diaphragm and assembly lined up and soldered in a similar manner to previous operations, using a minimum amount of solder applied round the outside edge of the 4" tube. At the same time sufficient heat will be found to travel up to the brass bushes (or junior op's bunsen burner can be brought in to help out), for solder to be applied round their junction with the 4" tube. When cool the final cleaning up can be done commencing with a pair of sharp tinsnips to remove the overhang of the diaphragm and a wet (dish ?) cloth to neutralise any corrosive from the solder that has crept through the inside of the diaphragm.

Drilling and fitting of the components to the bottom cover plate is perhaps best left until this stage due to necessity for lining up this plate with respect to the main body of the tripler such that (1) The grid rod makes contact with one of the grid ring fixing screws, and (2)

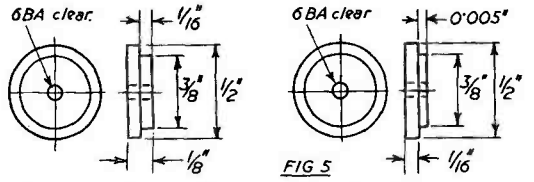


FIG 5

Grid and anode capacitor plate insulating bushes
Material: Bakelite, Tufnol, Mycalex rod 6 off each

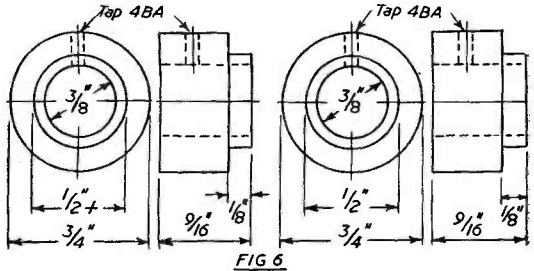


FIG 6

Output probe and output tuning capacitor bushes
Material: Brass rod 3/4" dia 1 off each
NB: Both these must tight push fit into 1/2" holes in 4" tube

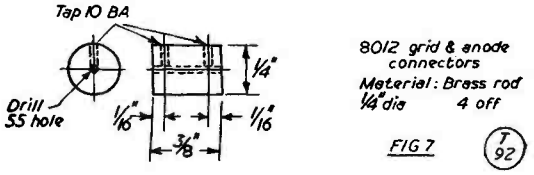


FIG 7

T 92

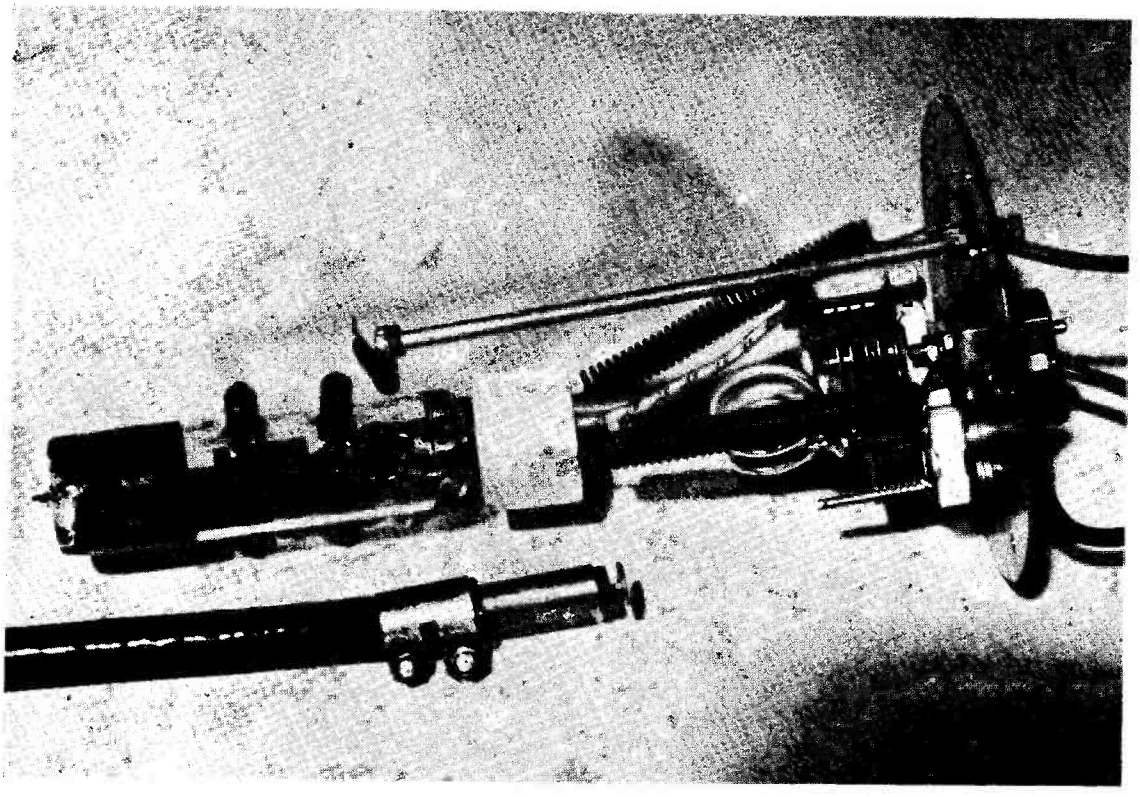
Drawings giving details of grid/anode condenser insulating bushes (Fig. 5); dimensions of output probe and output tuning condenser bushes (Fig. 6); and details for the 8012 grid and anode connectors (Fig. 7).

The valve when fitted to the porcelain connector lines up fairly accurately with the grid and anode clips. The above lining-up of course really rests with the location of the 6 fixing bolts. A suggested drilling template is given in Fig. 3, the Pi-network condensers being the small ceramic based screwdriver adjustment type common in surplus.

The output probe is shown in the foreground of the photograph of the drive section. The braiding is stripped from the end of a length of large diameter coaxial cable of the PT29 M or Uniradio 1 type, a length of thin wall brass tube being slipped over the polythene and held by the clip shown. The probe disc brass "washer," approximately 3/64" thick with a suitable hole in the centre, is soldered to the end of the inner conductor.

Tuning Up Procedure

It is suggested that an 829 be used to drive the Mk.II, although reduced input tests have shown that even an 832 run at its maximum ratings should still provide useful output on 70 cm. The writer has not seen data sheets



Exploded view of the 8012 70 cm tripler as described by G3HAZ. The two-metre drive circuit is the assembly on the right, bolted to the circular plate. The 8012 is a glass triode with plate and grid connections brought out on two sides of the envelope; in this design, the valve is mounted by its filament pins on a 3-way porcelain connector (centre), the spiralled leads being the RF chokes in the filament supply — see circuit Fig. 1. In the foreground is the RF output probe for 70 cm.

for the 8012, but it would seem sensible to operate the valve in an upright position, at least once the drive circuits have been tuned up.

With 6·3 volts applied to the filament leads, the anode earthed *via* the 100 mA meter and the 15 $\mu\mu$F condenser in its minimum position, it should be possible to obtain grid drive by tuning the Pi-network with the 50 $\mu\mu$F condenser. If now the 15 $\mu\mu$F capacity is rotated in small steps towards its maximum, and the 50 $\mu\mu$F condenser retuned for maximum grid current at each step, it should be possible to find a position where the grid current peaks up to a maximum and then falls back again. The maximum grid current position is the correct tuning point and should result in very little heating of the coaxial drive cable. The output circuit capacity C5 should now be tuned to resonance (output probe not yet inserted) indicated by a sharp drop in anode current reading down to 30-40 mA and a small rise of grid current. With the aerial or dummy load connected the probe should now be slowly introduced, retuning slightly with C5 for minimum anode current until a loading of some 65 mA is indicated. It is possible to overcouple, giving reduced output, so that a check with the nearest 70 cm station is advisable to get optimum coupling adjustment. When loaded to 65 mA it will be found that application of 500 volts HT will increase the anode current by only some 15 mA, most of which increase seems to go towards warming up the anode a little more ! The output does, however, go up by a few more watts although when modulation characteristics are investigated the chap at the other end will very likely suggest you remove the HT again !

Modulation Considerations

When running without HT, modulation is applied to the driving stage exactly as on 2 metres, resulting in a very full blooded carrier on 70 cm — provided, of course, that the 2-metre modulation is up to scratch. When running with HT, modulation must be applied

to both driver and tripler stages *together*. About 50% modulation to the driver stage and 80% to the tripler stage is required, based on their respective DC inputs and the fact that for 100% modulation a 100-watt carrier requires 50 watts of audio at the secondary of the modulation transformer. (Not the usual 2-metre technique of a watt for a watt ! !) Such splitting up of the modulation power output needs selection of taps on the modulation transformer secondary which may not always be convenient. *Should the tripler stage only be modulated it will not be possible to achieve 100% modulation and speech quality will be markedly inferior.*

One further point arises in connection with modulation and that is the possibility of acoustic feedback between tripler and microphone. When modulated the unit will be found to chatter away quite merrily, the symptoms being much more in evidence when modulated HT is applied, and occasionally sufficient to set up a high frequency feedback howl.

CW operation presents no difficulties, the 2-metre transmitter being keyed in the normal manner whether running with or without HT applied.

Testing

Power output ? The writer hopes he is conservative when suggesting 15 watts without HT and 20 watts with HT when driven to 20 mA grid current. Lamp loads seem to be rather variable in their characteristics at 435 mc, possibly due to glass losses. A 6 volt 18-watt bulb in the writer's possession can be lit to good brilliance without HT and can be persuaded to arc over internally across the filament supports with HT and a little modulated persuasion. Suffice it to say, perhaps, that the unit invariably receives a good report and has so far given no trouble whatsoever. Provided it does not occur directly from the 2-metre transmitter tank circuit, radiation on 2 metres will be found to be very much down compared with the usual run of 70 cm transmitters. Without HT the unit obviously makes an economical driver for a straight PA of the QQV06/40, 4X150 or 2C39 type.

Mk.III versions ? Well, yes, we have ideas on what form this may take, and in fact G3BKQ has already tried one using the prototype Mk.II unit in a lash up.

The author would like to acknowledge his indebtedness to G3BKQ for suggestions and constructive criticism when designing the Mk.II and its prototype, also for standing by on so many occasions during on-the-air tests.

Comprehensive Metering

VOLTAGE/CURRENT MEASUREMENTS ON A SINGLE INSTRUMENT

G. WHITBY

Rows of meters are always as useful as they are attractive to the average amateur, but even at the low prices now ruling for some of the surplus types, they can become rather an expensive item. This article shows how a single 0-1 mA moving-coil instrument can be used for checking voltage and current at points at which it would not normally be economical to provide permanent metering.—Editor.

ONE imagines that there are few amateurs who have not, at one time or another, been envious of the comprehensive metering facilities that are usually fitted in the larger communication and broadcasting transmitters. In station operation—whether amateur or professional—occasions arise when a quick check on the operating currents and voltages of the equipment is invaluable, and none more so than when the Aerial Amps. are stubbornly absent and somewhere inside the " box of tricks " is a faulty stage.

Of course, in a large transmitter, comprehensive metering is a necessity because when the doors are opened the power supply is automatically switched off—so it is essential to have a check on the operation of every stage without having to delve into the interior with a portable meter. However, in addition to this it is generally recognised that a simple voltage-and-current check through the stages of a faulty transmitter (or receiver) usually pinpoints 80% of the troubles that are likely to occur. If an immediate check is possible, then the work of fault tracing and repair is minimised, with a consequent saving of both time and temper.

Comprehensive checking facilities on the operation of a transmitter, receiver or other piece of equipment can be provided so simply that one wonders why they are not used more widely. All that is required is a reasonably sensitive meter — an 0-1 mA movement is

highly recommended — and the necessary switching arrangements, together with a little ingenuity in picking the test points and wiring them up. The additional facility in no way replaces existing meters which may already be installed in vital circuits—it merely augments them.

Voltage Measurement

The principles and use of a milliammeter as a volt-meter will be familiar enough to most readers. However, when a voltmeter is used for the routine *checking* of known voltages, as distinct from accurately measuring them, a modification is permissible which may be useful.

When a meter is used for normal voltage measurements it is usual for the voltage range of the meter to be as near the actual voltage as possible. However, when it is employed merely to check that a known voltage is what it should be, then the reading can be made on any part of the scale without serious inconvenience.

An example may be useful : If a 1 mA meter is to be used to check that 300 volts is being applied to an HT line, there are two ways of doing it. First, by connecting a 300,000-ohm resistance in series with the meter it can be turned into a 1,000-ohms-per-volt instrument with a full scale deflection of 300 volts, and in this condition the meter is being used in its most sensitive condition so far as the voltage is concerned.

The second method is to connect 600,000 ohms in series with the meter, which converts it into a 1,000-ohms-per-volt instrument with a full scale deflection of 600 volts. The 300 volts deflection will therefore be approximately mid-scale, *but* the meter is now working as a 2,000 ohms per volt instrument *so far as the 300 volt HT line is concerned.* The insertion loss of the meter is halved, with only a slight decrease in sensitivity which, for routine checking of the voltage, is not of much consequence.

The formula for conversion of a milliammeter to a voltmeter is

$$R_{series} = \frac{1000 \text{ (Maximum voltage to be measured)}}{\text{Full scale deflection of meter.}}$$

The maximum voltage being, of course, the full scale deflection voltage.

Fig. 1 shows a circuit for using a meter as a comprehensive checking voltmeter and it will be noted that there is no limit to the number of voltage points that can be checked by this method. If a single rotary switch has insufficient positions to accommodate them all then

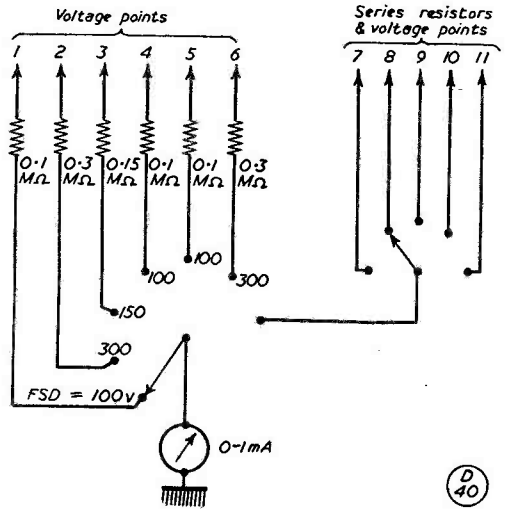


Fig. 1. Wiring diagram for voltage measurement at eleven separate points in a circuit, and showing how a second rotary selector can be switched in if the first selector has insufficient switching positions. The basic idea is to make one 0-1 mA meter, with suitable series resistors, function as a check voltmeter on circuits which are not normally metered continuously.

a second rotary switch can be " switched in." This facility is also shown in Fig. 1.

A word of warning regarding the use of a comprehensive checking voltmeter. Do *not* place a meter checking point directly across the anode of a valve ! Not only will the high valve impedance make the meter look like a low resistance shunt across it, so lowering the anode voltage but, of more importance, the inherent capacity of the permanent wiring to the meter selector switch will upset the output from the stage—particularly if it is an HF stage. Incidentally, it is as well to remember that *all* DC voltage and current measurements should be taken at points which are decoupled so far as AC (AF or HF) is concerned.

Current Measurements

Switching a milliammeter into several optional positions can be quite a complex business, but the switching to be described is not particularly complicated, can be inserted into existing equipment with the minimum of trouble and has the advantage, like the voltmeter arrangement, that the meter can be switched across any number of different circuits. Furthermore, the resistances involved can be values chosen at will and are not related to the meter resistance in any way. This latter is a definite advantage for the amateur with limited facilities for accurate resistance measurement.

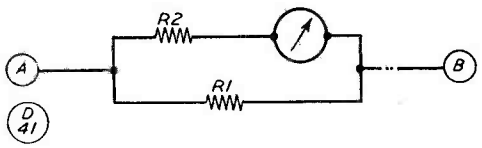


Fig. 2.

The arrangement is not new. In fact, it is widely used and is known as the Universal Shunt. The principle is as follows:

If the circuit in which the current is to be measured is connected to points A and B in Fig. 2, then the current flowing through R1 will produce a voltage IR1 across it. The combination of R2 and the meter is a voltmeter to measure this voltage, which is read off the meter as current—the current range of the meter being extended to any required maximum value by the relationship of R2 to R1.

It can be proved that the arrangement shown in Fig. 2 is essentially a network which, when associated with a meter, has a current multiplying factor of R2/R1 and perhaps a numerical example will clarify this point and assist the reader to design and construct Universal Shunts to his own requirements.

If a 1 mA meter is used and R_1 is a 10 ohm resistor inserted into a circuit through which 5 mA is flowing, then the voltage drop across $R_1 = V = IR_1 = 0.005 \times 10 = 0.05$ volt.
R1

Now, the value of R_2 must be such that the meter (fsd = 1 mA) will give full-scale deflection when 5 mA flows through R_1 — a current multiplying factor of 5. Therefore:

$$R_2 = \frac{\frac{V}{R1}}{Im} = \frac{0.05}{0.001} = 50 \text{ ohms}$$

and R_2/R_1 = 50/10 ohms, which will give the required multiplying factor of 5. Similarly, for other multiplying factors it is only necessary to obtain the correct ratio of R_2 and R_1. The internal resistance of the meter can be ignored unless R_2 is less than, say, ten times that of the meter resistance. If it is, then the resistance of the meter should be deducted from the calculated value of R_2.

R1 should be as small in value as possible, because the insertion of a comparatively large value of R1 in a circuit will reduce the current flowing in it. Incidentally, it is possible for R1 to be very low; the author recently converted an old 1½ mA movement into a car ammeter by utilising the almost negligible resistance of two feet of very heavy battery cable for R1 and a suitable value of R2 (R2 in this case was a potentiometer which was varied until the meter deflection on a known current matched up to the calibrated scale !). The gadget works well—and without disturbing the car wiring in any way. So it will be appreciated that R1 can be almost a dead short when the current to be measured is large and a suitable value of R2 is used.

For comprehensive checking R1 should be permanently wired into the circuit to be measured and R2 placed in the selector switch wiring between R1 and the switch (Fig. 3). The meter is then switched across them when a measurement is made. A convenient method of measuring valve current is either to use the by-passed cathode bias resistor as R1, or to place R1 between the bias resistor and earth line. An advantage of this method is that one side of the meter is connected to earth, simplifying the switching arrangements, but a disadvantage is that the meter will read the total valve current and this fact needs to be remembered when the valve is other than a triode.

A word regarding the calibration of the meter. So far as DC is concerned it is better to employ the existing meter calibration, using multiples of its range where necessary, the multiplying factor being marked opposite the position where the selector switch pointer comes to rest. The author has found it a simple matter to multiply, mentally, the meter reading to give the actual value of the current, particularly when the multiplier is x10, x100 or x1000.

Alternating Currents

These measurements can be made by using

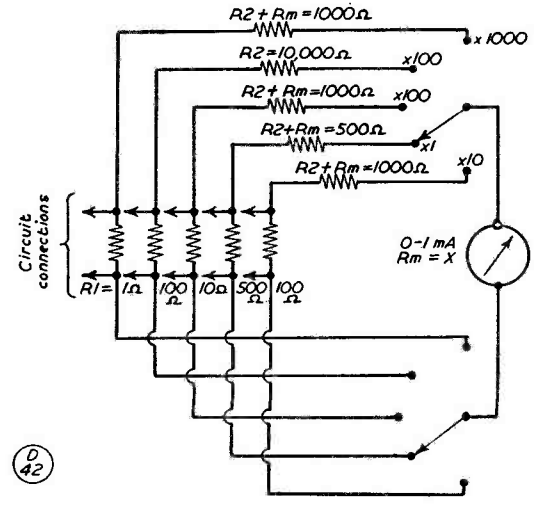


Fig. 3. Wiring layout for current measurement at five separate points in a circuit, the principle being the same as in Fig. 1. except that parallel resistors are involved. The switching motions can be carried out by a 2-pole 5-way rotary selector.

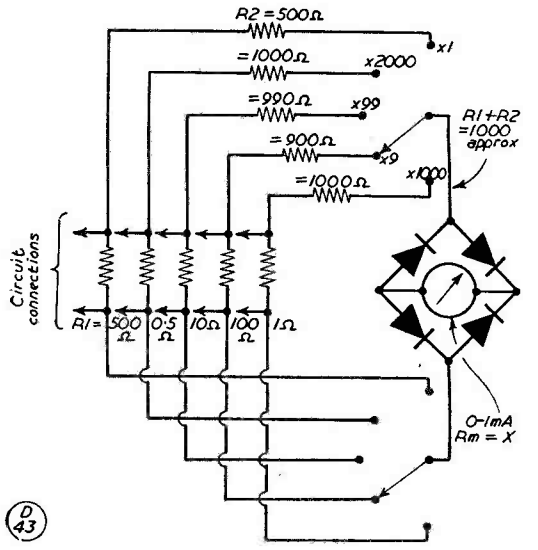


Fig. 4. With this arrangement AC current can be measured at five separate points in a circuit. As in Fig. 3, a 2-pole 5-way rotary switch can be used.

the arrangement shown in Fig. 4 and it differs slightly from the measurement of DC in that the total resistance that the combination of meter and rectifier "sees" (=R1+R2) must remain constant for all ranges of current if the convenience of a single calibrated scale for AC is desired. (Perhaps it should be mentioned at this point that the DC scale of the meter will bear no relationship to AC values and a special scale must be calibrated for this purpose). Apart from this modification the principle of operation for measurement of AC is the same as that for DC.

The meter rectifier should, of course, be matched to the basic scale of the meter and need not necessarily be the bridge type of rectifier shown in Fig. 4. It is as well to remember, in passing, that inaccuracies may be introduced if the AC frequency is above 10,000 cycles, that permanent connections should not be made to any point likely to be affected by the stray capacity of the selector switch wiring, and that the scale should be calibrated on a sine wave (AC mains current is commonly used for this purpose) because the rectifier output is liable to variation with change of waveform.

Conclusion

If the meter is mounted permanently in a transmitter, receiver, or other cabinet it is useful to bring the meter terminals to the outers of a "break-jack" in a manner such that the insertion of the jack-plug picks up the meter, at the same time disconnecting the normal circuit from it, thus enabling the meter to be used independently of the equipment in which it is installed—an occasionally useful facility, particularly if the meter is a good one. The jack shown in Fig. 5 is ideal and is actually used by the Post Office in conjunction with a plug which picks up both of the isolated spring contacts, breaking away the inner contacts,

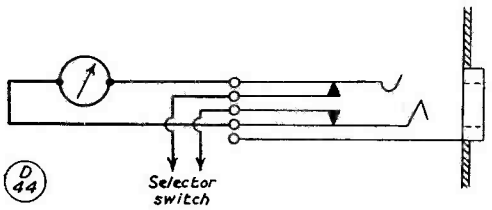


Fig. 5.

while not employing the frame of the jack, which may be mounted in a metal panel if necessary. (*See* Fig. 5 above.)

An elaborate and complete circuit diagram has not been included because the arrangement of a comprehensive metering circuit is necessarily dependent upon the reader's own requirements. However, the figures have been rendered as complete as possible so that they can be used as a general guide. The meter employed in these diagrams is a 0-1 mA movement and is strongly recommended, but a more sensitive meter, or one slightly less sensitive, may be used with equal facility.

PHOTOGRAPHS WANTED

We are always glad to see photographs of Amateur Radio interest—either of equipment, meetings or personalities—for possible publication in *Short Wave Magazine*. Prints can be almost any size, but must be clear and sharp; they should be identified on the back (lightly in pencil) and any descriptive notes or explanations should be attached separately. All such photographs used are paid for on publication.

Aerials and Common Sense

PART II

ZEPP-FED SYSTEMS—AERIAL COUPLING AND MATCHING —SITE PROBLEMS

THE OLD TIMER

The first part of this article appeared in our April issue and bears upon much of what is discussed below in dealing with the Zepp system—one of the oldest and perhaps the most ill-used of amateur-band radiating systems.—Editor.

IN last month's instalment there was a good deal of discussion on the best method of feeding an aerial, once the location and length of the top had been settled. So as not to confuse the issue, one very popular method was deliberately omitted, so that it could be commented on at some length in this, the second article.

The type referred to is, of course, the "Zepp"—that indispensable device for feeding almost any type of wire *at the end*. Amateur transmission seems to be particularly beset by this little problem—how to live with one's gear near the end of the aerial and still to be able to feed RF into it with reasonable efficiency. In the commercial world, of course, it does not exist — if one wants to feed an aerial, one simply builds the transmitter house in the right place for doing it !

The very fact that the average amateur is somewhat short of the space he would really like, when you come to think it out, implies that his shack is more likely to be at the *end* of his aerial than anywhere else. Most houses have a preponderance of back-garden and much less in front ; and the layout in use at the vast majority of amateur stations must surely consist of a straight piece of wire running away from the shack—as far as the garden will allow it to run.

If the aerial in use is a dipole for one-band operation, then the normal co-ax feed in the centre presents no problems even then ; but if it is to be a general-purpose, multi-band affair, then some form of end-feeding is the answer.

Quite apart from the problems of geometry and geography, it happens to be the case that an end-fed wire can be used on a multiplicity of bands with no change either to the aerial or the feeders—only a change in the *tuning* of the latter.

This is so because an end-fed wire will always present a high impedance at the end (we refer, of course, to a wire of one of the chosen lengths —33 ft. 6 ins., 67 feet, or 134 feet). Or, in the other form of parlance, it will always be "voltage fed." A 67 ft. wire with tuned feeders at the centre will present a low impedance on 40 metres (dipole), a high impedance on 20 metres (two half-waves in phase), a low impedance on 15 metres (three half-waves) and a high impedance on 10 metres (four half-waves). But put the same wire up and feed it at one end, and it shows a high impedance on *all four bands.*

Operating the "Zepp"

An open-wire feeder (of 600 ohms or so) can be coupled to the end nearest the shack, simply by connecting one feeder to the aerial wire and leaving the other one loose in space ; and then, no matter what the feeder length may be, it will always be possible to arrange a match at the bottom end. Fig. 1 shows what a "Zepp" really is . . . a half-wave aerial with a quarter-wavelength of feeder is shown in Fig. 1 (*a* and *b*) to be nothing more than a full-wave aerial subjected to suitable bending operations ! The current and voltage distribution on the wires are virtually unchanged ; so the bent part of the aerial (a half-wave of wire but now consisting of a quarter-wave of double feeder) shows a high impedance at the top, where it joins the aerial, and a low-impedance at the bottom, where it enters the shack. It can, in fact, be fed down there just as you would feed a 72-ohm line—with a link of one or two turns coupled to the tank coil.

If you make the feeder twice as long, you will have, in effect (see Fig. 1c) an aerial of three half-waves, of which only one is used as the radiator, and the other two as the feeder. Thus in this case you will have a high impedance, both at the junction of aerial and feeder, and at the bottom end of the feeder. In such a state of affairs the feeder is tapped across a fairly large number of turns of the coil in the aerial tuning unit, and is "voltage fed."

As the whole purpose of this series is to discover, and to encourage, the simplest possible approach to aerial problems (which naturally include everything pertaining to feeders) we must stress right now that this following fact must be remembered and

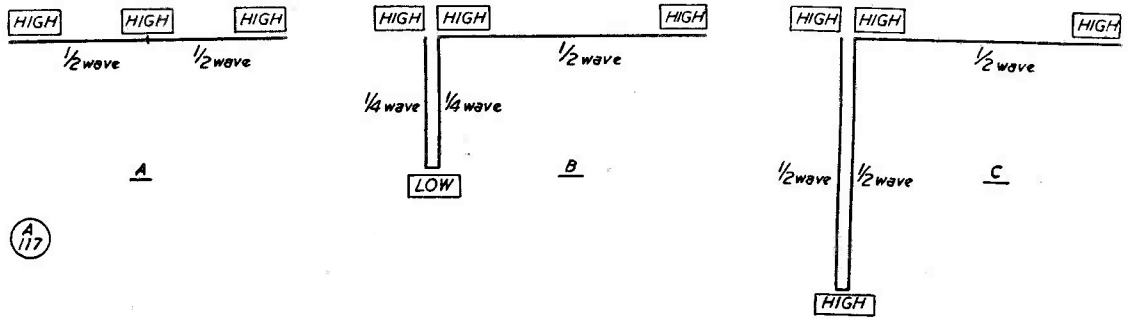


Fig. 1. Illustrating the well-known Zepp aerial system, familiar in amateur working. As shown at (b) and (c), the length of feeder affects the impedance to be matched, and hence the method of feeding, at the transmitter end. It will also be seen that (a) is an "opened-out" version of (b), and is the best way to think of the Zepp.

thoroughly absorbed — that whatever state occurs on a pair of symmetrical feeder lines will be reproduced once more at a point one half-wave further along the line, and again at two half-waves, and at all multiples of half a wave.

Just as our simple dipole exhibits high impedance at the ends and low impedance at the centre, so will any length of tuned double transmission-line show a high impedance at a series of points half a wavelength apart, with a low impedance at the quarter-wave points evenly spaced between them. Call them "voltage and current nodes," by all means, but we are trying to be consistent and think in terms of *impedances* all the time. After all, anyone with a smattering of radio knowledge would know that you must match a high impedance with another high impedance, and a low with a low; but they might be quite befogged when set the problem of dealing with "a voltage loop" or "a current node."

So here, in a nutshell, is all one wants to know about "Zepp" feeders: If the wire you are feeding is a half-wave or any multiple thereof, the impedance where the feeder joins the aerial is *high*. Therefore, if your feeder length is a multiple of a half-wave you will be faced with a *high* impedance at the bottom, and if it is an odd multiple of a quarter-wave you will have a *low* impedance at the bottom.

Convenient Lengths

Take a typical case again—the 67 ft. top and the 33 ft. 6 in. feeder. On 40 metres the feeder is a quarter-wave and shows a low impedance at the bottom; on Twenty it is a half-wave and shows a high impedance at the bottom. On 15 metres it is again low, being a three-quarter-wave feeder.

To avoid having to use radically different methods of coupling at the bottom end for these three bands, one can strike a compromise and use a feeder some 40 feet in length. This will not present the same impedance on all bands, but it will at least dodge the awkward state that one encounters with an exact half-wave—the very high impedance. Such a condition is tricky to feed, and the "live" feeder tends to take charge and behave as part of the radiating system. Avoid an exact multiple of a half-wave, if you possibly can, for your feeder length. The 40 foot length is somewhat longer than the quarter-wave on Forty, but is still showing quite a low impedance; it is likewise longer than the half-wave on Twenty; and on the other bands it is likewise in between the two.

(over)

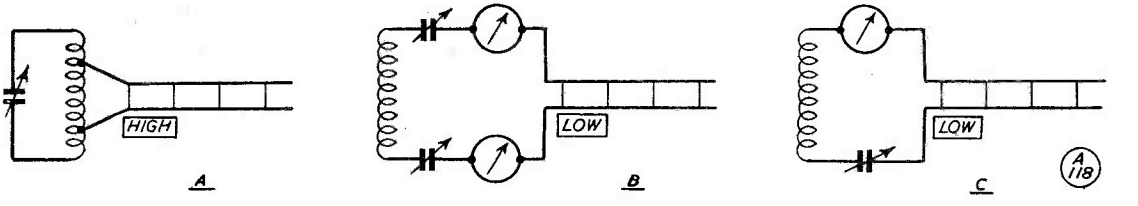


Fig. 2. Methods of coupling the Zepp feeder line, having regard to the impedance to be matched, as indicated in Fig. 1, and discussed in the text. In (b) the RF current meters should read the same while in (c) the adjustment is for maximum RF meter reading — in both cases consistent with proper loading of the PA. In the days when RF meters were not obtainable as readily as they are now, it was the fashion to use bulbs (flash-lamp or car side-lamp, depending upon the power involved and the RF currents expected) as indicators in a Zepp-fed system.

For Forty, Twenty and Ten an ideal feeder length used to be around 44 ft., where the conditions at the bottom end could be made to remain very similar for all three bands. But the fifteen-metre band has altered all that, since 44 ft. is very nearly a full wave. We still find, however, that something of the order of 39 or 40 feet is very easy to handle, and looks like something between 100 and 400 ohms on all four bands. Even for Eighty, of course, it is still suitable, being something less than a quarter-wave ; in that position the impedance is rising once more, and the figure will probably be between the above limits even on that band.

There, then, is an idea for a good general purpose aerial : A 600-ohm tuned feeder of 40 ft. or thereabouts, coupled to a top which may be 33 ft. 6 ins. (for Twenty and Ten only) or 67 ft. (for Forty, Twenty, Fifteen and Ten) or 134 ft. (for Eighty, Forty, Twenty, Fifteen and Ten). Last month's instalment furnishes all the information you need about the directions in which it will radiate best on the various bands, but in any case at least eight amateurs out of ten will have no choice of direction and will therefore have to decide on the most suitable *length* instead.

". . . . Ever tried balanced feeders, Fwed ? . . . ."

Coupling Units

Many a good aerial system has been wrecked by unsuitable arrangements at the bottom end. The means of transferring the RF from the transmitter tank circuit to the feeders is of the utmost importance, and particularly so with a system of tuned feeders such as the Zepp. The mistaken idea seems to exist in some quarters (judging by layouts that we have actually seen) that a pair of feeders can be taken in through a window, clipped on to opposite ends of a coil which is tuned by a condenser, and dangled within a convenient distance of the tank circuit — whereupon the whole thing will settle down in a nice state of symmetry. Nothing could be further from the truth—and it is just this sort of effort that has led many a beginner to propound the theory that Zepp aerials simply don't work, not at *his* QTH !

Consider Fig. 2. The tuned circuit shown is *not* the transmitter tank circuit, but a completely separate circuit link-coupled to the latter.

If the feeders present a high impedance (that is, if they are anywhere near a half-wavelength long) they will probably need coupling to it as in Fig. 2(*a*). High voltage, low current—and therefore no useful reading if thermo-ammeters are provided, but plenty of indications of life on a neon bulb or similar device.

If they are nearer to a quarter - wave (or odd multiple), then Fig. 2(*b*) will be the method required. Series tuning, high current

into the feeders, and nothing showing on the neon bulb. This may be modified into Fig. 2(*c*), with only one series condenser and only one thermo-ammeter.

An ideal aerial tuning unit will be so designed that series or parallel tuning are both available, but when one has to provide for taps on the coil (as in Fig. 2 (*a*)) the thing becomes a little complicated. So an excellent compromise can be effected by an arrangement such as that shown in Fig. 3. Here we have the coil tuned by two condensers in series, and the feeders connected across one of them (C1). Provision is made, by bending a vane, for shorting out C2 completely when it is tuned to maximum capacity.

Thus the really high-impedance condition is met by shorting out C2, leaving C1 in parallel with the coil *and* the feeders ; this position is suitable for use only when the feeders present a really high impedance. For coupling into a low impedance, C1 is set to zero and tuning is achieved by adjusting C2, which is of course *in series* with the coil and one feeder. And for intermediate impedances, logically enough, we use intermediate settings of the condensers, tuning being carried out by swinging the two together until an optimum position is found.

Tuning must at all times be done with one eye on the thermo-ammeter, for a maximum current indication, and the other on the PA milliammeter, to ensure that the normal state of PA loading is maintained. Under-coupling or over-coupling become quite obvious if the conditions of " too much dip " or " not enough dip " are shown in the PA anode circuit.

Flexibility

Looking at Fig. 3 again, it will be seen that the two variable condensers C1 and C2 may be regarded as a kind of RF potentiometer across the coil ; so that the point " B " (their junction) is really a tap across the coil which may be moved up and down. Since the two condensers are in series, the condition of resonance may be maintained with a great variety of settings and therefore a great variety of output impedances. Therefore it is safe to say that, whatever impedance the feeders may present when they arrive through the window, it will be possible to provide them with a match. The correct sizes of coil, and the correct numbers of turns for the link windings, must be found by experiment.

While this simple tuning unit is in focus, so to speak, it is an opportune moment to emphasise that some similar scheme is always

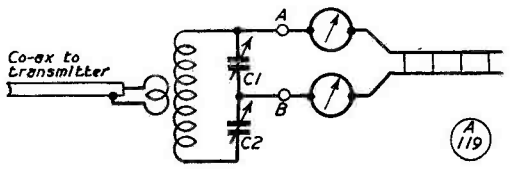


Fig. 3. When it is convenient or necessary to use a coaxial coupling system between transmitter and aerial tuning unit this is the method by which a Zepp system can be fed ; C1, C2, comprise a movable tapping point for the B-leg of the feeder line, the adjustment being to obtain equal, and highest possible, reading in the RF meters consistent with proper loading of the PA stage.

worth using, whatever the type of aerial (unless a dipole is being fed directly with low-impedance co-ax).

The unit of Fig. 3 may be used to feed any type of aerial using tuned feeders, and most of the " single-ended " types. The Windom, touched on briefly in Part I, may be attached to point " A " on the unit, point " B " then being directly earthed.

Alteration in the capacities of the two condensers will, in these circumstances, have the effect of moving an earth-tap up and down the coil. Of course, the point " A " may be earthed and " B " connected to the aerial, thus moving the *aerial* tap up and down the coil, but this means that both condenser rotors are live to RF, with all the attendant troubles of hand-capacity effects and even RF burns ! So this state of affairs is not recommended.

Similarly, a very long wire which is end-fed —literally, by bringing the end of the radiator itself into the shack—can be handled very conveniently by this same system. Whether the wire is the right length (very high impedance, then) or whether it is too long or too short (lower impedance), a match can always be found. And, of course, such a long wire will probably be used on several bands, and will look like a different impedance on each of them, so the flexibility of this very simple unit will be indispensable once again.

Physical Factors

While we are still considering only the simplest types of aerials, and the simplest means of coupling them efficiently to the transmitter, we had better clear up some of the points concerning the actual method of erection. We have repeatedly stressed the fact that the amateur's aerial is nearly always a make-shift of some sort ; and this is why care is necessary.

For instance, if the home end has to be hung on a metal gutter, or, perhaps, on a chimney stack which is not far above a metal gutter,

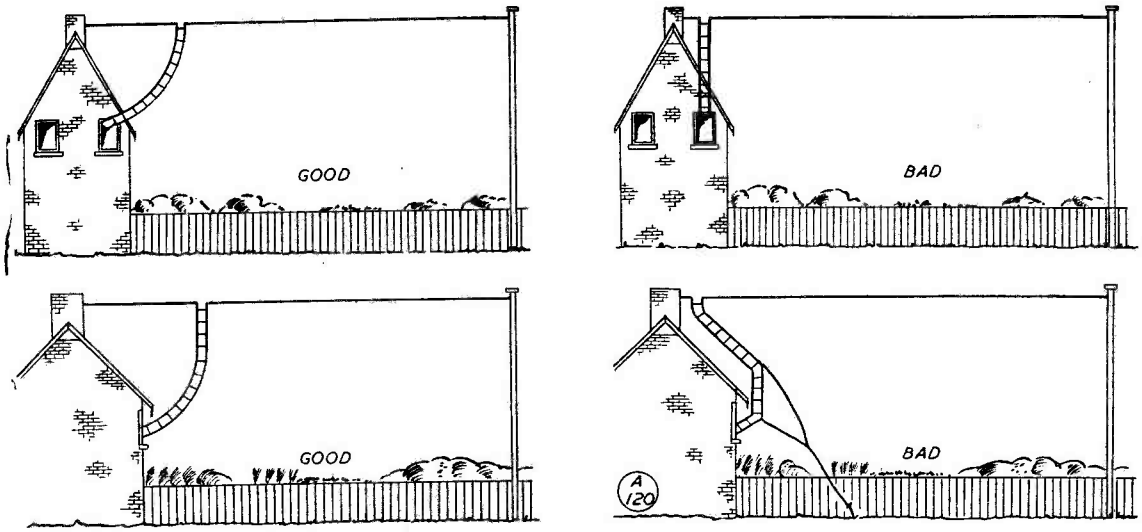


Fig. 4. Suggesting feeder layouts for a Zepp system. The aim should be to get the high-impedance feed point at the house end as well in the clear as is reasonably possible, with an easy run for the feeder line.

it is far better to sacrifice a few feet of length than to have the live end of the aerial within inches of the guttering. Similarly, if the end of the aerial is up somewhere near a chimney-stack, with Zepp feeders attached, it is most undesirable to let the feeders come too near the gutter or the edge of the roof. Lead them out into the clear somehow, or, better still, shorten the aerial itself if this is possible. Fig. 4 shows a sketchy idea of some good and bad arrangements.

Most of these hazards come at the " house " end, but others arise, in the form of obstructions like trees, telephone wires, and other buildings. Likewise steeply sloping ground presents problems of its own. (We know of at least one case in which the garden slopes upwards so steeply that the *bottom* of the mast at the far end is higher than the home end of the aerial !)

Trees and overhead wires simply have to be dodged as well as the space available will allow. Crossing telephone wires at right-angles is not a bad thing ; if one has to run parallel with them, all sorts of curious induction effects are possible, including the " blocking " of the telephone system when the transmitter is on the air ; and also, undoubtedly, the distortion of the polar diagram of the aerial itself.

It should hardly be necessary to speak of overhead high-voltage wires ! At the risk of emphasising the obvious, we say " Give them a wide berth "—and, even if only working *near* them, treat them with great respect.

If you have a choice of direction, always think in terms of freedom from obstructions of any kind. Even if your clear run is not in the direction that you think would be most profitable for DX work, it will usually work out that the clear run is best.

If you have to erect an aerial of sorts on the roof of a high building, and your shack is near the ground, then you have very little choice. Your direction and length are probably both fixed for you before you begin. Nevertheless, we have come across cases of extraordinarily good results achieved with a simple dipole up on the roof of a block of flats or apartments, with a considerable length of co-ax running down the wall. Even on bands for which the aerial was not designed, the whole thing can sometimes be end-fed at the bottom —but this is only making the best of a bad job.

Inside Work

In cases where the shack is not located near the point of entry of the feeders, sundry problems have to be solved. It is obviously impracticable to run open-wire feeders along passages and through rooms, but 72-ohm coax can be installed, in most of such cases, with ease and convenience.

There is therefore only one satisfactory solution — put your aerial tuning unit (completely boxed and screened, if necessary) as near as possible to the entry of the feeders into the building. Then run coax from the link on the tank coil to the link on the aerial tuner.

It is true that this necessitates a certain amount of physical exercise for every change of band, but once the thing has been set up for the first time the condenser settings can be logged and the adjustments will be largely repetitive.

There are even occasions when this practice has to be used when the aerial enters an upper window and the shack is in the basement ! For it is not always possible to bring tuned feeders down outside the house, while coax can possibly be coped with, either inside or out.

In these and all other peculiar situations, the guiding motive is quite simple—leave aerials and open-wire feeders out in the clear, and do all RF transference at low impedance. Even though a 600-ohm tuned feeder is often regarded as non-radiating, it may carry a very high standing-wave ratio, and is a most undesirable thing to have in long lengths inside a building (or even running outside in close proximity to a wall). So keep the RF and all high voltages " in the clear " and rely on low-impedance coax for the internal piping of RF !

(To be continued)

Note on Relay Operation

DELAYED ACTION WORKING

B. W. F. MAINPRISE, B.Sc., A.M.I.E.E. (G5MP)

MANY stations use relays for automatic switching and break-in operation. For some purposes, such as muting the receiver or applying HT to the transmitter, it is desirable to arrange for the relay to remain closed during keying, and to open only after keying has been interrupted for more than a second or so.

One convenient method of obtaining this delayed-action release is to connect a condenser of large capacitance across the relay coil ; then, when the battery circuit is broken, the condenser discharges through the coil over a sufficient time interval to keep the relay closed. Such an arrangement was shown some time ago (pp. 408-409, September, 1946) in *Short Wave Magazine*.

To prevent any possible disappointment, it should perhaps be mentioned that this method is suitable only for high resistance relays, working with a current of two or three milliamperes. It is not suitable for low resistance relays. To make the position clearer, let us take the case of two imaginary relays.

Relay No. 1 has a coil resistance of 10,000 ohms. The holding current is 3 mA (corresponding to 30 volts across the coil), and it releases when the current falls below 2 mA (20 volts across the coil). A 50 μF condenser across the winding will be able to maintain a discharge current of above 2 mA for the required second or so of delayed release.

Relay No. 2 has a coil resistance of 100 ohms. It holds with a current of 60 mA (6 volts across the coil), and releases when the current has fallen to 40 mA (4 volts across the coil). A 50 μF condenser across the coil, charged to only 6 volts, will certainly not be able to maintain the discharge current above the required figure, and the delay period will consequently be extremely small.

This does not mean that low-resistance relays are not as useful as the higher resistance types. In fact, their requiring a lower voltage—conveniently obtained from a couple of batteries of the cycle lamp type—is often a great advantage, but for delayed action with a low-resistance relay it is probably better to choose one of the " slugged " type.

The slug consists of a copper cylinder placed on the relay core, alongside the coil winding. If the slug is between the coil and the armature the relay will close slowly, and the release will also be slightly delayed. If, on the other hand, the slug is on the side of the coil remote from the armature the relay will close normally but release slowly, which is the sequence of operation more usually required.

VHF TRANSMITTERS FOR THE B.B.C.

In connection with plans for the introduction of FM Sound broadcasting in Band II (87.5-100 mc) in this country, the BBC have placed an order with Standard Telephones & Cables, Ltd., for twelve 10 kW transmitters, Type C.F.4, and the same number of one-kilowatt sets, Type C.F.2. These transmitters embody all the latest principles and practices of modern design for unattended remote-control operation. There will be twin installations at each transmitter site.

DX COMMENTARY

L. H. THOMAS, M.B.E. (G6QB)

DL4EF

SPRING conditions are now in force, which means, broadly speaking, that the DX lasts longer on 14 mc, shows up a little more often on 21 mc, but is harder than ever to get on the LF bands.

To those who still think of DX in terms of 1947-48, the bands are shocking; to those who have acclimatised themselves to the present state of the sunspot cycle, they are still pretty interesting.

The excitement of real DX on the Top Band has now subsided, and the detailed story of the winter's doings will be found elsewhere in this issue. So the Top Band devotees have now settled down to the regular business of working locals and medium DX, with the WABC-chasers still finding plenty to interest them.

Some very nice "expeditions" were out around Easter-time, but we shall not be able to record their results until next month.

Certificates and Awards

We are glad to announce that the third *Magazine DX Award* has been issued to Howy Bradley, W2QHH, who has satisfied all the requirements, including the working of three continents and fifteen countries on 18 mc. He is the first station outside the U.K. to claim the MDXA, the other two holders up to date being G2PL (Wallington) and G8KP (Wakefield).

Talking of Certificates, we were interested to hear one W station telling another, on twenty-metre phone, that "the Short Wave Magazine of London issues some mighty nice awards called the Wonnacker, the Wabbeck, the Wooffee and the Feebah." That's as near as we can get to phonetic spelling, but we identified them as the WNACA, WABC, WFE and FBA, and are delighted to know that they have all been issued with "handles." (U.S. readers, please note once more that the WNACA is *not* available to amateurs in the U.S.A. or Canada).

CALLS HEARD, WORKED AND QSL'd

The DX Bands

Opening the roll-call with *Twenty* this month, we feel like commenting on the state of the North Atlantic path around midday. Since last autumn we have been keeping a regular sked with W2BCR (Newburgh, N.Y.), who uses 750-900 watts and a Vee-beam aimed at London.

During November and December his signal could only be described as phenomenal. It was always several dB over S9, with a pronounced echo coming round the long way. Sometimes the *echo* was as strong as S7-8.

Since January the signals have been getting steadily weaker until nowadays they are sometimes only S5-6. This refers, of course, only to times around 1330-1430 GMT —later in the day the path improves a lot. But the big change over a couple of months or so is worth noting. We should add that W2BCR's power and beam are still doing their stuff, since on days when he is down to S6 there is seldom anything else audible from that direction.

G6VC (Northfleet) worked VP2AD, HS1D, ET2PA, FF8AC and a few others, as well as EA9DF, and enjoyed himself in the ARRL DX Contest. But he found things patchy all the time.

G3DO (Sutton Coldfield) raised VP2DL and FM7WO, both on phone; otherwise most of his QSO's were with South Africa and North America. In a later note he reports a 14 mc phone QSO with ZC5VR (North Borneo) at 1630 on April 17, for the latter's first G on phone. ZC5VR is looking for G phones with a 2-element beam.

G3TR (Southampton)—also on phone—had a few interesting ones including VP2 (both Windward and Leeward Is.), VS2, VE8, SVØ (Rhodes) and the usual VK's and ZS's. An unusual one was

PY1WH in the state of Espirito Santo, leaving only one more state to be worked for the W.A.B. Certificate on phone.

G3EHT (Wadebridge) — phone again — lists HP3FL, PJ2AF, TI2DIM, TI2WLC, VP2DL, VP9F, VP9L, YV5BQ, ZS3AB and ZS3E, together with W6 and 7, VE6, 7 and 8. A strange one was KL7AON, S8/9 both ways at 2000 GMT. KL7's have been frequent in the early mornings, but are not common at this latter time of day.

G4ZU (Croydon) was happy to raise JZØKF and AC4NC on CW, as well as FY7YC and VK9YT (New Ireland) on phone. G3CMH (Yeovil) got his phone through to FM7WO, PJ2AA, VP2DL and VP6WR. Nice gotaways were CP5AB, CR5NC, MP4QAH and VP2DN.

G3NA (Hereford) worked the band with a 5-watt "one-lung" transmitter and raised W1, SU, ZC4, 4X and lots of OH's—then returned rather thankfully to the Top Band!

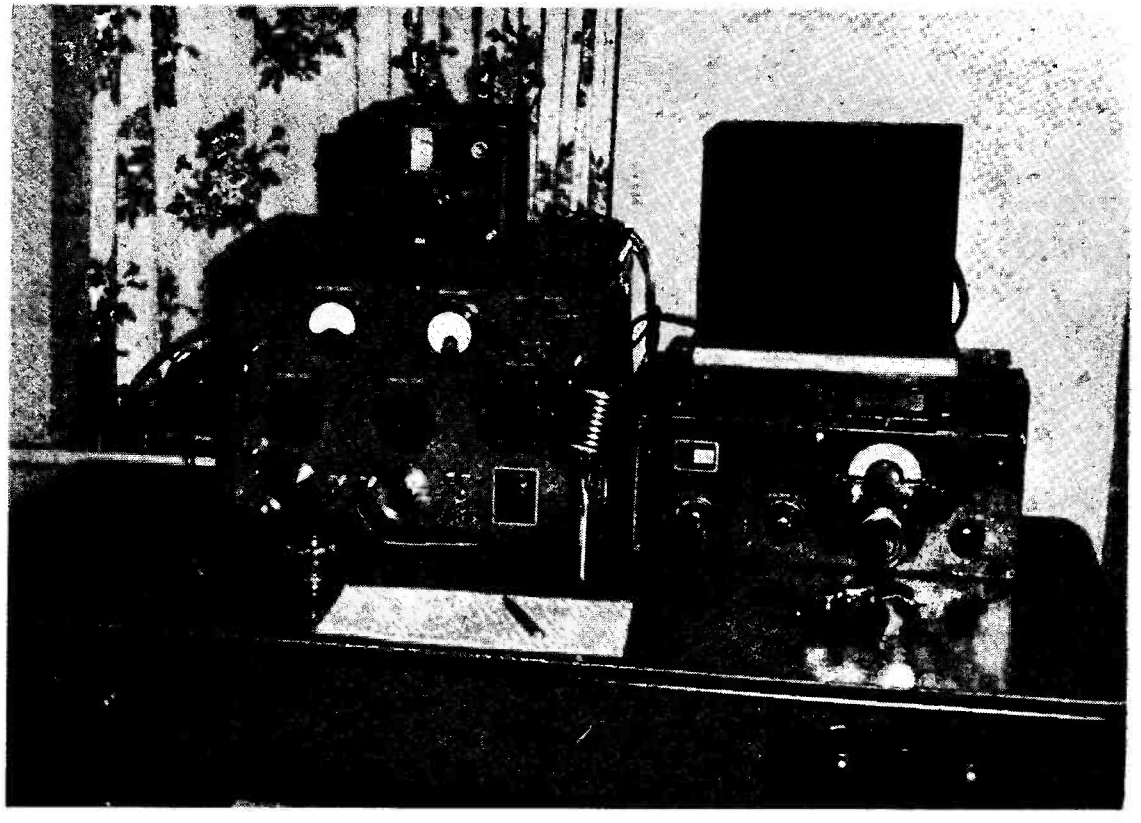
The DX on 21 mc

Opinions on this band are mixed, some saying that it is not nearly as good as last year, and others insisting that it is much better. From what we have heard of it, we would not like to give an opinion; it seems to be the *activity* that fluctuates so much, rather than the conditions.

There is certainly more phone than CW activity at present, and those who are really familiar with the band and stick to it seem to do very well. New ones on phone for G3HCU (Chiddingfold) were CP5EK and PJ2AA. Other nice ones from his list are CR6AG, ET2PA, HZITA, OD5AV, plus lots of VQ's and ZS's. 'HCU noted some good openings to the West, and heard YV5AB, KP4's, LU's and PY's around April 10 and 11. CX5AF was also heard, ploughing steadily through the ZS's.

G2BW (Walton-on-Thames) has rebuilt and moved the gear into a new shack, and now hopes to resume regular reporting. He has already put his band score up to 85.

G4ZU has leapt up to 93 (88 on phone), and has found the band much improved and open



G2FFY, Bexleyheath, Kent, runs a very neat table-top rig incorporating only the essentials. On the left is the converted T.1403 transmitter, with built-in VFO and modulator unit; the PA is plate-screen controlled, at an input of 75 watts, the modulator being 6SJ7-6N7-p/p807's. The receiver is a (German) Lorenz E52B, tuning 1.5-25 mc, with an optical bandspread system giving 1-kc points in the range 1.5-2.0 mc, and 10-kc points in the 21 mc band; the BFO is CC, and is used for calibration purposes with check points marked on the scales. This receiver, one of the best of the Lorenz designs, also has a dual crystal gate with variable bandwidth. Above the transmitter is a TE-149 CC frequency meter/monitor. For G2FFY, interest in Amateur Radio goes back to 1927, and cards of that period are held from stations still active on our bands.

until 2200 on some nights. DX during the month included PJ2, CP, EA9, EL, ZS3, ZS7 and VU.

New ones for G3TR on phone were CR4, HZ, LU, MP4 and VU, but he found it "very poor—far worse than last year." G3CMH also stuck to phone and raised KP4TA (1950), LU3DD (1945), PY2JU (2045), VQ4RF (1945) and YV5AB (2055), but CP5EK and CR4AE got away.

Forty Metres

Very few people have anything to say for *Forty* at all. Some very intriguing DX has been possible there during the winter, including, of course, the W6's and 7's "long way round" in the afternoons and hordes of ZL's in the mornings. Nowadays that seems to have gone by the board.

G3DO worked VQ4AQ on Forty *phone*, S6/7 both ways, at 1830 GMT one day. 'DO was using a 275-ft. end-fed wire. G4ZU, on phone, collected VQ4AQ, YI2AM, ZC4RX, ZB2A and 4X4FK.

G2HKU (Sheerness) got on the band with his QRP and raised ZL3OZ on a CQ (569), which encouraged him somewhat. Some W's also replied to his CQ's at various times.

News from Overseas

VQ4DW has arrived home from Kenya on six months' leave, and may be contacted at 28 King's Avenue, Carshalton Beeches, Surrey.

4S7XG is another who will be home shortly, but he hopes to get his DXCC from Ceylon before doing so. (He has worked more than enough, but the cards don't arrive). Recent scalps were JZØKF, ZS3U, FN8AD, OD5LX, VK9AU and 9YY, and C3WA.

VQ4EI (ex-ZC4DT and VT1AC) is one of the few amateurs we have met who does not claim to be in a "bad location." He admits that VQ4 must be one of the best places in the world from which to work DX! In six months' operating from a hotel bedroom he has collected 108 countries, compared with only 93 in eighteen months from ZC4.

Talking of the other VQ4's, '4EI tells us that VQ4ERR (who is the only amateur in the world with WAZ-Phone) has now raised 108 on 21 mc; that VQ4AQ has 212 worked; and that a new one to watch is VQ4EU, who has a fine QTH and is erecting a rotary ZL-Special. Incidentally, one of the best times for a chat with VQ4EI seems to be in the early mornings—0630 GMT onwards.

The former ZS6ACD has now changed QTH and been allotted the call ZS1ACD. At the moment he is rather sad, finding that the DX pours in, but with Table Mountain right behind him he doesn't seem to get out! However, he was cheered up by a contact with 4W1UU, and hopes to be putting in 100 watts before long.

Top-Band Topics

Just before Easter we received a telegram from GM3HLQ (Aberdeen) worded "Shall be portable from Nairn to-night Top Band." A letter, later, explained that he and GM2CAS were, in fact, setting forth to give the boys their contact from Nairn—one which was promised earlier in the year but foiled by the snow and ice of the Frozen North. Having heard tell of a car loaded down with gear, 300-ft. of wire to a box kite, and sundry long wires for stringing up to trees, we imagine and hope that this latter expedition to Nairn was a huge success.

(In a stop-press note he reports he was, in fact, there, and that the

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
VQ4RF	108
G5BZ	96
G4ZU	93
G3GUM	91
DL7AA	90
G4ZU (Phone)	88
G2WW	85
G2BW	85
G3HCU (Phone)	79
G2YS	74
G6QB	73
G3TR (Phone)	69
G3DO	68
ZS2AT	66
G3CMH	62
G3CMH (Phone)	60
G6QX	56
ZE3JO	55
G2DPY	38
GM2DBX (Phone)	32
G5FA	31
G8VG	18
4S7XG	11
G2DHV	11

FIVE BAND DX TABLE

POST WAR

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	649	85	154	216	90	104	221
G6QB	587	52	107	220	73	135	234
G5BZ	558	60	110	227	96	65	233
G2VD	493	47	89	178	70	109	187
G2WW	474	23	70	189	85	107	196
G4ZU	473	12	45	203	93	120	210
G2BJY	459	48	77	141	77	116	179
G3DO	440	24	46	195	68	107	221
G3FXB	439	60	109	172	59	39	174
G5FA	406	34	118	150	31	73	166
G6QX	404	51	96	144	56	57	166
G2YS	380	52	68	142	74	44	158
G2BW	353	24	57	144	85	43	155
G3GUM	328	31	38	168	90	1	177
GM2DBX*	319	21	31	154	32	81	163
G8VG	278	35	76	123	18	26	140
G2DHV	177	20	23	108	11	15	112
4S7XG	160	1	27	110	18	4	110

* (Phone)

venture was a success. Parked in a field at Auldearn, on 1860 kc, with a 300-ft. kite-supported aerial, the queue soon formed up on the frequency; GM3HLQ says he would like to thank those concerned for their considerate operating No butting in, no block calls and no queue-jumping. It was a joy, says GM3HLQ. Every contact has been QSL'd—and his next trip will be into Invernesshire).

The various forays into rare Welsh counties were, we know, greatly appreciated. The difficulty, now, is finding new spots to invade with Top-Band gear. Anyone interested in Sark?

G6VC raised GM6JH to put his score up to 83—he thus becomes the highest "G" scorer on the ladder. He heard UB5KAB on about 1810 kc one night (339) and gave him a buzz, but nothing happened. (But see our own "buzz," later on, about the Russians).

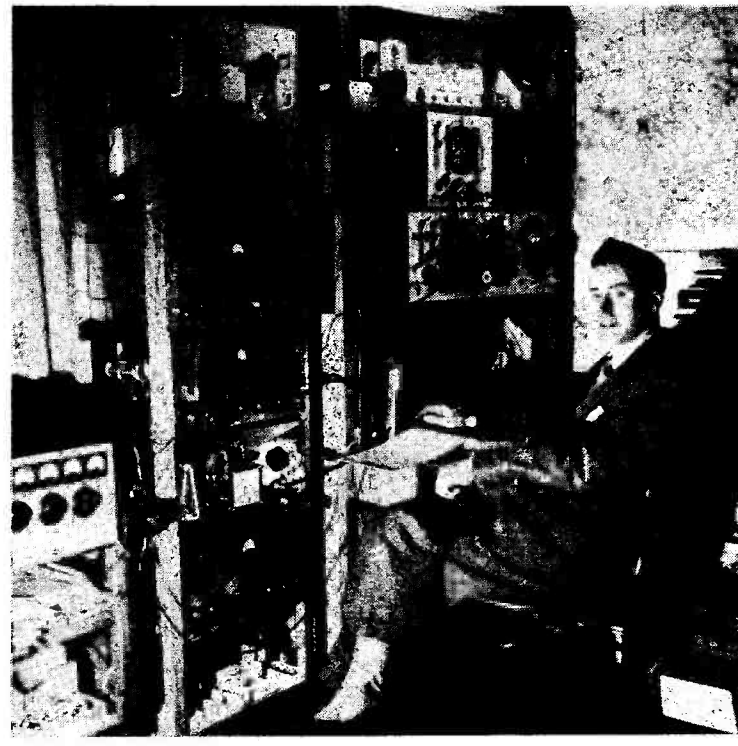
G3CMH (Yeovil's Club station) has been on the band for the first time in six months. His impression was that an awful lot of WABC-collectors must need Somerset—a CQ brought so many replies that he couldn't cope! Best QSO was with GI3IOS.

G2HKU has now received his card from ZC4JA, who, it appears, was running 30 watts and using an SX28. G3NA still runs a 6V6 single-stage transmitter (CO) and a 136-ft. Marconi, but the addition of a Pi-network for aerial coupling seems to have improved things. He was pleased to receive a 589 report from an SWL in the northern province of Sweden—nearly 1000 miles.

During the month WABC's have gone to G3HYJ (Norwich), G3JEL (London, N.7) and G3EUK (Bath). Incidentally, with his application G3HYJ remarked that he heard UB5CF (2330) at about 559, but didn't raise him. G5PP did, though—so it looks as though we are in for some ultra-curtain activity.

TOP BAND COUNTIES LADDER
(Starting Jan. 1, 1952)

Station	Confirmed	Worked
GM3IGW	86	88
GM3EFS	83	85
GM3OM	83	85
G6VC	82	83
G5LH	82	82
GI6YW	81	81
GI3HFT	81	81
G2NJ	78	78
G3HIS	77	80
G3ELZ	77	78
G3HIW	69	77
G5JM	66	80
G2YS	66	75
G3IVH	66	68
G3CO	66	68
G8TS	64	69
G3HTI	63	68
G2AYG	63	64
G2DVD	61	63
G3JEL	60	73
G3IOX	60	70
G3EUK	60	68
G3HYJ	60	65
G3CFG	60	62
G3LP	60	60
G3JEQ	57	68
G3DO	55	58
G8VG	44	56
G3ITY	44	54
G2HKU	43	46
G5FA	37	52



Operating from Killarney in Co. Kerry is EI4E, who came on the air in 1951. Most of his gear is home built from "surplus," and activity is mainly on 80-metre phone, running 25 watts to a 5-stage transmitter which can also be used on 20 metres. His aerial is a 127-foot folded dipole made of 300-ohm ribbon and the receiver a modified R.1155. Auxiliaries include a Selectojet with built-in Monitone, an oscilloscope, a Q5'er and a BC-221.

Cross-Band Work

G5JM (Buckhurst Hill) has joined the cross-banders, and reports 9S4AX (Saarbruecken) as a new one, started off, as usual, he says, by G5JP. DL7AH seems to be the most regular, and others are SM6ACO and 7AKG, PAØGIN, OK2KBA, ON4IE and the above-mentioned 9S4AX. The 80-metre stations seem to like it, because they can copy the Top-Banders more easily than the average signal on Eighty.

G5JP (Hawkinge) has a lot to say on the subject, and is disgusted

to find that what he calls "the innocent occupation of getting a Top-Band report from odd spots in Europe *via* the 80-metre band" is now marred by the antics which accompany other activities. It seems that 'JP induced 9S4AX, on Eighty, to QRX for him on 1820 kc, but before he got there (which took 30 seconds) someone else had moved even faster and got in first!

'JP elucidates one small mystery for us. If the people who reported, some time back, hearing SM6ACO and SM5AQW calling CQ on the Top Band, had really listened . . . They would have received the message in full as "CQ de SM6ACO *via* G5JP," together with full details of calling and answering frequencies.

G3JP worked LZ1KPD on 80 and asked him to listen on Top Band. The LZ couldn't hear him, but reported that he *had* heard G3FGT calling CQ; 'JP couldn't raise 'FGT to tell him so, so this note may be a pleasant surprise. Other cross-banders for G5JP were F7SHP (Paris) and SM8AYN/MM, returning from French Equatorial Africa.

GM3IGW has now become G3IGW again, after doing sterling work for the WABC enthusiasts while in Clackmannanshire. For himself, he finished up with a phone WABC with 62C, with a total of 88C worked. He has been one of the most consistent and successful stations on the 160-metre band.

Rumours and Buzzes

There is a very strong rumour going round that the Russian amateurs are being "released" again as from May 1, after which date they may once again work foreign countries freely, although there is some suggestion that not *all* foreign countries will be permitted. (*VK, perhaps.—Ed.*)

If this is true (and you should know by the time you read this) one of the most interesting possibilities will be that of adding perhaps ten or a dozen more countries to the Top-Band repertoire. It remains to be seen what happens from May 1 onwards.

Various DX expeditions are heralded for this year, but they are all delightfully vague—probably with sinister intention! It seems fatal for an expeditor (is that the right word?) to publish firm dates in advance; what usually happens then is that lots of people work him before he gets his gear unpacked.

The Clipperton Island (FO8AJ) saga sagged—nothing happened; this is one which is promised for "later in the year." A Cocos Is. (TI9AB) effort also failed, and W6MHB now promises it for *next* year—well, we can wait!

VR6ZA has been heard working VR6ZB—a most unlikely QSO, when you come to think of it, and almost certainly a hoax.

ST2UU promises activity in the near future, possibly from VQ7 and VQ9 again. No dates!

And that brings us to the end of this month's offering, rather curtailed by the Easter holidays and the early date necessitated by them.

Next month's deadline is **Friday, May 14.** For the July issue it will be *June 18.* Address all news and views, scores and claims to "DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Until then, 73, BCNU and Good Hunting!

Firs to operate from the Australian Antarctic was VK3ACD, on Macquarie Island in 1948; this was before VK1 calls were issued for this area. The three points in the Antarctic from which Australian amateur operation could be carried out are Heard Island, Macquarie Island and MacRobertson Land.

TRANSISTOR TOPICS

Conducted By — G3HMO

In view of the interest and importance attaching to transistor development in the field of Amateur Radio, we have decided to establish "Transistor Topics" as a new, regular feature. In charge will be G3HMO, whose recent articles in SHORT WAVE MAGAZINE *on the practical aspects of transistor work have attracted wide attention. Himself a keen experimenter with transistors and successful in obtaining results on both LF bands, his object will be to gather together the experiences of other transistor-transmitter operators, so that this feature will mirror progress and development in an important new branch of the Amateur Radio art. Accordingly, all who are engaged in any sort of transistor activity are invited to send in their results for discussion under this heading.*—EDITOR.

THERE seems to be a steady increase in amateur activity with transistor transmitters. G3IYX (Bradwell, Bucks.) is on almost every evening on 1822 kc and has had two-way transistor QSO's with G3HMO and G6FO at distances up to 9 miles, with high signal levels (RST-589x at G6FO) both ways—this with transistor transmitters at both ends. Moreover, on April 19, signals from G3IYX were copied at G5WW (High Wycombe, 28 miles), the latter also identifying the transistor signals from G3HMO and G6FO at about the same distance.

During the evening of March 22, G6FO (Maids Moreton, Bucks.) obtained reports of from 229x to 449x from GC3HFE (Guernsey, 188 miles), G3PU (Weymouth, 112 miles) and G6QB (Bexhill, 100 miles), using his single-stage transistor CO on 1814 kc, running 65 milliwatts input — but he has the advantage of a half-wave N/S aerial on the Top Band. However, the reception of G6FO by GC3HFE —admittedly no more than the identification of the signal through a chink in the QRM—is probably the existing record for transistor working on the 160-metre band. Anyway, we hope to hear of it if anyone else has had reports or contacts over such distances.

From Buckingham, G3HMO has been working phone with a CO-PA modulated three stage all-transistor transmitter, with very good reports locally, G5RZ (Leighton Buzzard, 15 miles) giving RS-55 on phone. At G3HMO, it has been found possible to get a home-made transistor (as described in the April issue) working CO on 3541 kc in the 80-metre band, using the circuit as given at Fig. 5B on p.15 of the March issue of *Short Wave Magazine*. This has produced local contacts with G6FO on CW and phone. The immediate intention is to put a second (home-made) transistor on as PA and see what can be done in the way of getting QSO's over greater ranges than can be expected on the 1.8 mc band.

So much for the activities of one particular group, whose circuits are discussed later in this piece—but what of the rest of the world? There is certainly much amateur transistory which has not yet come to our notice, so if you are active write in and let us know. Of particular interest are the band, the ranges achieved, the circuits and the type of transistor(s) used. We have not had any news of Transistor Receivers on the amateur bands. An opportunity exists for the record-breakers to make the first all-transistor Tx/Rx two-way QSO. The first step will be a transistor receiver reporting a transistor transmitter. If the distance involved was more than 10 miles, this would be an achievement in itself.

This leads to another important point, namely, ranges to be expected. The power with a single transistor is limited to some 100 mW input, though push-pull and parallel-push-pull transistor circuits offer some scope, as reported by G3CCA (Leicester) in the March issue of *Short Wave Magazine*. The increase in S points at the receiving end, achieved by increasing the input above the maximum rating, is likely to be so slight that the danger of damaging the transistor in the process (especially if it is a commercial one) rules this out as a method of increasing range. Increasing the efficiency of the PA would be worth while if this could be done. But here again, unless the initial efficiency is very low, improvements in reports will be very slight. Almost certainly the most fruitful line to follow will be in improvements to the radiating system, both in power transfer to the aerial and, on the higher frequencies when we come to them, the directivity of the aerial system.

However, results can be and have been obtained over quite long distances with conventional aerials, provided they give good results with the QRO rig. The QRP gear *will* get through, and the limiting

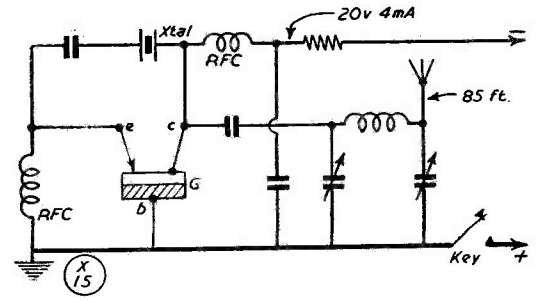


Fig. 1. Transistor circuit in use by G3IYX on 1822 kc, with an 85-foot aerial and Collins coupler; his input is 85 milliwatts and he radiates a very good local signal up to 10 miles or so, with a 28-mile reception report as best DX so far. G3IYX is regularly active from Bradwell in North Bucks and can be found on the air most evenings.

factor seems to be QRM on or near the crystal frequency. So the self-evident DX technique is as follows: Organise your skeds during times when the band is quietest, only call CQ when there is no QRM, and watch for any S9 CQ call on or near the crystal frequency. If the station calling is strong with you, there is a good chance that he will hear you come back to him.

Circuits

In Fig. 1 we give the circuit used by G3IYX. The tank consists of a Collins-coupler and aerial choke-capacity fed from the collector. Feedback to the emitter is *via* the crystal and a small fixed condenser. The transistor is an S.T.C. type running at 80 mW input. G3IYX is putting out a very good T9x signal to which it is a pleasure to listen.

Transistor Phone. The G3HMO phone transmitter in its present state is shown in Fig. 2. It is a logical development of the transmitters described by the writer in the March issue of *Short Wave Magazine*. The first stage is a crystal oscillator with the crystal feeding back from the collector to a tuned circuit capacity coupled to the emitter. Incidentally, by mentally omitting the crystal, can you see the similarity to the Franklin oscillator? Two-phase reversal valves are used in the Franklin, so that the output is back in phase with the input. Only one transistor is needed, because the output is in phase with the input, anyhow. In fact, this circuit has worked as a VFO (by shorting out the crystal), but the coupling is much tighter than in the Franklin, so that the stability leaves much to be desired. The PA is also similar to the circuits described in the March issue. It is the original transmitter circuit modified by disconnecting the crystal and putting the emitter on to a tap on L1 to give it drive from the CO.

The RF output from the CO-PA line-up is not very different from that obtainable from the CO alone. The advantage is that we can modulate the PA without upsetting the CO. The modulator is a simple one-stage LF amplifier, transformer-fed from the carbon microphone and transformer-coupled to the collector of the PA, to provide "plate" modulation.

Values. So much for the circuitry, and now for the details of Fig. 2. L1 is a dust-cored coil tapped about one fifth of the way up from the earthy end. This provides a suitable matching point to the emitter of the PA. C5 is a fixed capacity in parallel with C4, the CO tuning condenser, in order to avoid a large variable condenser and still keep plenty of capacity in the circuit.

The PA has the same values as the original transmitter (Fig. 5B, p.15, March issue) and seems quite stable. No attempt has been made to neutralise this stage. It will probably not be quite as easy as neutralising a triode valve and may need something in the way of a neutralising resistance as well as the usual neutralising condenser, to avoid any pulling of the aerial tuning on the first stage. This does not matter much with the crystal, but was the main difficulty when trying to VFO.

The modulator follows the usual earthed-base circuit, and therefore needs a low impedance input. The transformer T1 is a carbon microphone type with a tap on the secondary, so that a step-up of only 1:3 can be obtained. The bias current of about 2 mA is provided by R2 in series with a 3-volt battery, and is by-passed by C9. The output or modulation transformer is a 1:1 suitable for matching 5000 ohms to 5000 ohms, or thereabouts. As far as can be judged at present, none of the values anywhere in the transmitter are critical, but those given may not be the best possible in any particular set-up, and some substituting of values may be worth while.

It should be borne in mind that no two transistors are likely to have the same characteristics, and even in commercial types the manufacturers' tolerances are very wide. The transistors used in Fig. 2 here are: G1 and G2, home-made; G3, a GEC type GET-1. The GET-1 has a nominal cut-off frequency of 250 kc and, except in lucky samples, is unsuitable for HF applications. It is, however, very suitable for the modulator.

Setting Up Procedure. Put the milliameter at X1 and adjust C2/C3 for oscillation, indicated by slight rise in collector current. Monitoring the crystal frequency on the receiver, swing C4 until the crystal locks on. Next, with meter in X2, set PA collector current to about 3 mA with VR1, and check that the drive causes a slight increase. Now load the aerial with a F/S meter as described in the March issue. A slight increase in collector current may be observed when C6 passes through resonance. For CW the PA may be keyed at X2, but NEVER break the base circuit when both collector and emitter are connected.

For phone, connect modulator supplies and speak into the microphone. Quality can be monitored on the receiver. Depth of modulation can be checked by the flicks on the F/S meter and altered by changing the level of the voice and/or the position of the microphone.

Base-Tuned Transistor Transmitter

All the transistor circuits so far described have been, fundamentally, the earth-based amplifier (with feedback added in the case of the oscillator). Now we come to an entirely different circuit—the tuned base oscillator as used by G6FO and shown in Fig. 3. This is probably the most widely used transistor oscillator circuit and relies for its operation on the negative resistance characteristic of the base. An impedance in the cathode of a valve gives negative feedback, but in the base of a transistor gives positive feedback. A suitable impedance will therefore cause the circuit to be unstable, and if we incorporate a tuned circuit in the base, oscillation will be produced at a frequency determined by L and C. To get crystal control, the crystal is put in series with the tuned circuit and by-passed by a resistor to complete the DC path for the base.

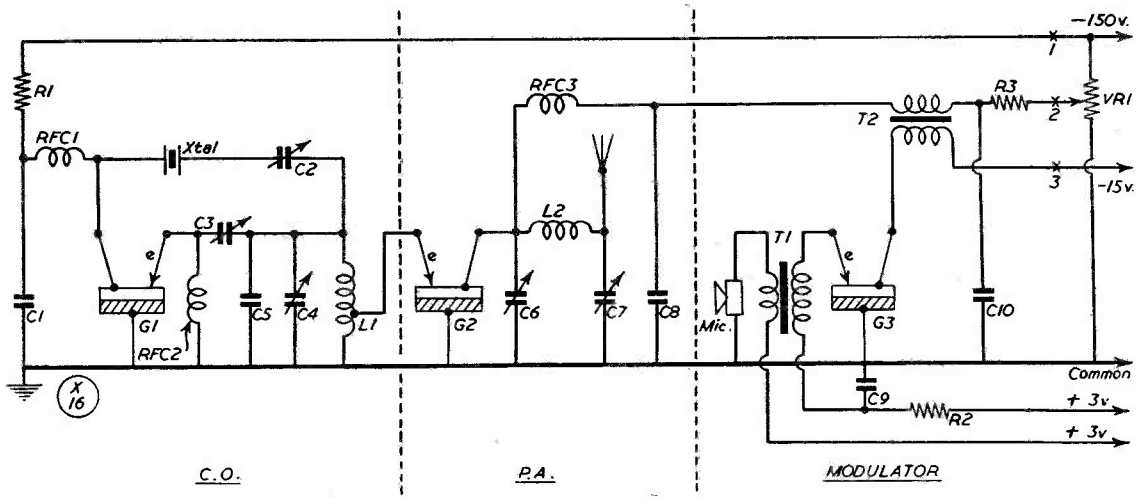


Fig. 2. Developed from the transmitter circuits described by G3HMO in the March issue and using home-made tran sistors — see April "Short Wave Magazine" — this is a CO-PA CW/Phone transmitter using transistors throughout. The crystal oscillator stage is G1, driving a second home-made transistor G2 as PA; the latter is modulated by a third transistor G3. On phone, the transmitter gives excellent quality with full modulation and ample signal strength for local working; the speech has been reported R5 at distances up to 15 miles. By omitting the crystal, G1 can be operated SEO (as a VFO) but stability is not good and the RF section tends to go badly FM under full modulation. At this stage of development, it would certainly seem that transistor transmitters intended for communication purposes require to be crystal locked.

Crystal Operation. A few details on setting up this transmitter (*see over*) will be of interest. First, C4 is removed; any 1.8 mc crystal will go off. With values and HT shown, the collector current will be 3 mA or less, and the emitter current less than 1 mA. Oscillation is obtained by mutual adjustment of C1 and C2 while monitoring the crystal frequency on the station receiver. Some form of aerial resonance indication is necessary, such as a tightly-coupled F/S meter with a microammeter scale reading. Alternatively, as the aerial coupler is tuned through resonance, a "build-up" of the signal can be heard in the receiver. Adjustment of C1/C2 should be such that keying is clean and sharp, with accurate following by the crystal—as for any CO transmitter, in fact.

SEO Operation. The circuit will self-oscillate by removing the crystal and substituting C4. The adjustment C1/C2 then becomes very critical, as for any SEO circuit in the TPTG mode. Whereas with a crystal settings are relatively flat, in the SEO they are much sharper. Settings will be found where the note is rough and unstable, but at best it can be brought to T8-T9 with, perhaps, a slight chirp. Aerial loading is critical, and adjustment should be made with the aerial on and the coupler at or near resonance. With some transistors there is considerable drift, but when the correct settings of C1/C2 and aerial loading have been found to give a T8-T9 note, the drift is very much less and the net result is a tolerable SEO signal adequate for local CW working.

Transistor News.

At the recent R.E.C.M.F. Exhibition many manufacturers were taking an interest in sub-miniature components for use with transistors, and three firms were showing transistors. It is hoped to give a table of commercially-available transistors in this column in the near future.

The Physical Society's Exhibition, held in the same week, also had several items applicable to semi-conductors. Two of particular interest will be mentioned:

G.E.C 40 mc Transistor Demonstration. A complete Tx/Rx was shown working on 40 mc. The transmitter and receiver were only separated by a few feet, but it was a most interesting set-up, since it showed so many possibilities. The transmitter was a point-contact transistor oscillating in the tuned-base circuit and modulated in the collector by a three-stage LF amplifier using junction transistors. An audio note was provided for the input to the modulator by a junction transistor LF oscillator, the sole power supply for which was, believe it or not,

Table of Values

Fig. 2. Crystal-Controlled Phone/CW Transistor Transmitter at G3HMO.

C1, C9 = 200 $\mu\mu$F mica
C2, C3 = 30 $\mu\mu$F air trimmer
C4 = 100 $\mu\mu$F tuning
C5 = 100 $\mu\mu$F mica
C6 = 200 $\mu\mu$F tuning
C7 = 500 $\mu\mu$F tuning
C8 = .002 μF
C10 = 0.5 μF paper
R1 = 70,000 ohms
R2 = 1,000 ohms
R3 = 10,000 ohms
VR1 = 100,000 ohms
L1, L2 = Coils for 2 mc: L1 tapped 1/5 turns from earthy end.
T1 = Mic. Input 1.3 step up
T2 = Modulation 1.1
G1, G2 = Home-made Transistors
G3 = GET1 Transistor

Meter Readings:
At X1 2 mA
X2 3-4 mA
X3 3-4 mA

a cell consisting of a piece of iron and a piece of silver immersed in tap water! In the receiver, a germanium diode detector was followed by three stages of LF using junction transistors. The output stage consisted of an *n-p-n* and a *p-n-p* type in complementary symmetry directly coupled to the voice coil of a loud speaker. When the iron and silver strips were immersed in the tap water, a clear audio note was heard in the speaker.

The other item of interest at this Exhibition was a show of one or two new crystals which may eventually be of great importance in semi-conducting devices such as transistors. Chemists will be familiar with the periodic table in which the elements are arranged in categories according to their properties. Germanium and silicon, which are at present the most important semi-conductors, come into Group IV of the table. Work being done at The Services Electronics Research Laboratory, Baldock, Herts., suggests that compounds of elements from Groups III and V, which are also semi-conductors, may have some useful and important properties.

In particular, the high-frequency response of point-contact type transistors is limited by the speed with which the electrons and holes can move in the germanium. In the (III-V) compounds very much higher speeds are found, so that we may one day have Indium Phosphide or Gallium Arsenide HF Transistors. Research has only been going on for about a year, and the big difficulty is in obtaining the very high degree of purity in these compounds necessary for practical purposes. However, important developments can be expected along these lines in the future.

So much for "Transistor Topics" for this month, which it is hoped will become a useful and interesting feature in *Short Wave Magazine*. You can help to make it so by sending in your news. There is just one other point: The term "transistor transmitter" is rather a mouthful. "Milliwatter" and "germitter" have been suggested as alternatives. What do you think? Write in and let us have your Transistor news and views. Next month's closing date being the 12th, you had better get down to it now, addressing your letter to "Transistor Topics," c/o The Editor, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

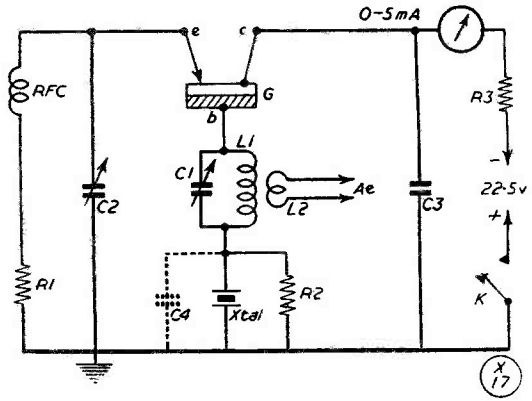


Fig. 3. The base-tuned transistor oscillator in use at G6FO, with crystal control; this transmitter radiates a T9x signal with a perfect note under CC conditions, and has been reported as 229x at 188 miles when the input was 65 mW. It will go off easily with any 1.8 mc crystal and will frequency-halve on 3.5 mc crystals! For SEO working, the crystal is substituted by a fixed condenser C4, and C1/C2 are adjusted as for a TPTG oscillator; settings are tricky, and at best the note is T8-chirpy in the self-excited condition. Like all transistor circuits so far developed for communication purposes, it should be used crystal-controlled for the best results.

Table of Values

Fig. 3. Base-Tuned CC Transistor CW Transmitter at G6FO.

C1, L1 = As for 1.8 mc band
C2 = 100 $\mu\mu$F
C3 = .001 μF
C4 = 200 $\mu\mu$F
R1 = 4,700 ohms
R2 = 1,000 to 5,000 ohms
R3 = 3,300 ohms
RFC = RF Choke, 2.5 mH
G = Home-made or any commercial point contact type transistor
K = Key
Xtal = Frequency in 1.8 mc band
Ae = Link to aerial coupler

Collector current averages 3 mA with values given.

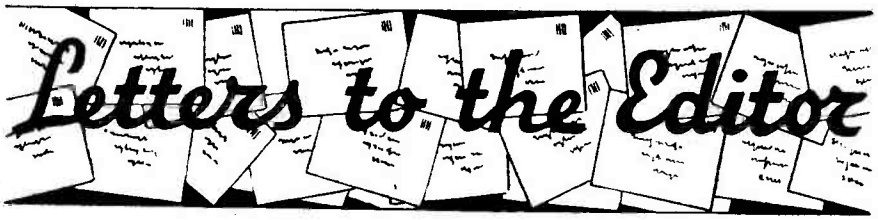
LATE FLASH!

MORE TRANSISTOR DX

During the night of April 20/21, 2310-0059 BST, G3CCA (Leicester) carried out a series of tests with his all-transistor transmitter running 50 mW on 1850 kc. Using phone, he first worked G3CFG locally at RS-58, then G3ERN (Harlow, 80 miles) at RS-33, followed by a solid CW contact with that station. At 0045 G3GGN (Littlehampton, 130 miles) came up to say he was copying G3CCA's CW at RST 569, and a QSO followed; a phone test was obliterated by QRM, but then G3IQO (Liverpool, 95 miles) called to say he was reading the G3CCA phone at RS-44. Thus, G3CCA had succeeded in putting all-transistor phone over distances of 80 miles in the south-easterly direction and 95 miles to the north-west, giving power-range ratings of 1,600 and 1,900 miles per watt respectively. The CW contact with G3GGN rates 2,600 miles per watt. The phone reports probably constitute world records using transistors (*subject to confirmation.—Ed.*), and G3CCA is to be congratulated on an outstanding achievement.

He reports that throughout these tests G3CFG (Kirby Muxloe) stood by as control and linking station, and that it was by his assistance that the contacts were obtained. The G3CCA phone/CW transmitter uses, in all, eight transistors; in the RF section, one as CO-VFO drives a pair in push-pull, coupled to a 132-ft. aerial series-tuned against ground. The modulator section consists of three transistors in cascade as speech amplifier into a pair in push-pull, modulation being applied to the push-pull RF output stage.

The contacts reported and the power-range ratings quoted in "Transistor Topics" this month constitute the first entries for the new table to be called Transistor Contact Record. It will appear in the June issue.



Letters published are those which seem to us to be of general interest, but should not be read as necessarily being in accordance with our own views on the subject. We welcome readers' comments.

XYL VIEWPOINT

SIR,—*I am writing to you because of the interest your magazine has for me. I have often thought that the XYL's are neglected, though, believe me, many of them help to keep the radio world turning. On 2-metre portable days, wives help pack this, carry that and, of course, are expected to provide the food. They help sort out the QSL's, and entertain the wives of visiting amateurs while the husbands get down to it in the shack; last year, a dear (visiting) ham-child nearly lost me an eye while passing the time by throwing stones at our cat. All these helpful activities are one of your main hopes for keeping Amateur Radio alive, with TV hours getting longer and the TV receiver always in the most comfortable part of the house. As I am interested in Amateur Radio myself, our shack is the pride of the house. Encouragement from one's husband helps to make for interest and gives one something to look forward to in these times.*

Ena McClelland, XYL-G6AG, 439A Rochester Way, Bexley, Kent.

"SIMPLE VFO-PA FOR 160 METRES"

SIR,—*Regarding the transmitter described in my article in the April issue, I would like to mention that using this rig (but with a pair of 6V6's in place of the 6L6 in the modulator) I have worked on phone six countries and more than 40 counties, including a 5-country phone QSO (G, GC, GD, GI, GM) on January 26 of this year.*

J. Booth, G3DMP, Flat No. 1, 136 Westgate, Wakefield, Yorks.

G3JFP ON PHONE

SIR,—*I write on behalf of John Proctor, G3JFP, the blind and handless operator. He is now active on 80-metre phone and has worked his first DL4. Perhaps it might be of interest to your readers—and helpful to G3JFP—to mention that he is crystal-controlled on 3715, 3720 and 3750 kc in the phone band.*

W. Pitfield, G3EDG, 4 Devonshire Street, Brighton, 7, Sussex.

NO OFFENCE MEANT!

SIR,—*At long last you have given over some space, usually devoted to TVI and other such fiddle-faddle, to readers' letters. Noticed that only one letter referred to brilliant experimentalist G1BF. Since 'way back Aug. 51, lack of G1BF how-to-do-it real-gen articles almost decided me not to renew. Now we get all this about transistors, much better left to supercilious boffin-type publications like . . . .* (suppressed.—Ed.). *What ham-masses need is practical, up-to-date dope on How to Work the Stuff, and no nonsense about proper aerials and not exceeding PA power rating. Reactionary Victoria Street bosses have held out on many new ideas like negative modulation and real sizzy T1 notes; but in recent QSO SPØOK told ur correspondent that these principles widely publicised in Zone 16, largely through new Popov-club station UTØPIA, operated by keen types in spare time after 18-hour day in uranium mines. They would be interested know if 'ole T20 at all-dash station OMØTO still forcing wallop up spout? Also did station signing SUSIE ever QSL? Here at DR1P, fox neighbours by operating in darkness, since they believe TVI and hash-QRM only caused when light on in shack window; glow from push-pull 813's (with parallel 813 modulator) shielded by water-cooled tin box, pumping 800 g.p.m. DR1P no clot! To put GPO van off scent, operate exclusively on 60-metre band, chatting nightly to East European cronies and drowning out BC QRM from "Radio Europa," BBC Third and any other cultural programmes. DR1P all guile*

DR1P, London, E.10.

THE WABC CERTIFICATE

SIR,—*In sending my application for your WABC certificate may I express my appreciation of the manner in which you have sponsored this particular award. I have obtained many interesting and enjoyable hours of operating while "county-chasing" and I am sure that many other hams, especially those holding the newer calls, are doing likewise. The only comment I have to make is that it is one thing to work the required number of counties, but considerably more difficult to get their QSL's. In collecting my cards, I have worked 68 counties, but still await cards for the other eight. G3GMN and myself sincerely hope that our expeditions to put some of the rarer GW counties on the Top Band map will help others to get their WABC.*

R. W. Curtis, G3EUK, 7 Fairfield View, Fairfield Park, Bath, Somerset.

SIR,—*Having just completed a portable expedition to Nairnshire, and having posted each QSL arising therefrom direct, I wonder if some people realise that I, too, am striving for WABC and still await cards for contacts made six to nine months ago. Everyone was anxious for the rare card*

from Nairn, but it does seem a bit hard that I am unable to get in the cards I need.

C. P. Callanan, GM3HLQ, 50 Greenloan Avenue, Glasgow, S.W.1.

NOISE SUPPRESSION

SIR, — *Recently I fitted an Eddystone mains filter unit in my receiver power line and the results suggest that many amateurs who curse vacuum-cleaner interference and QRM of a like nature might well follow suit. From the complete obliteration of any reception with our own vacuum cleaner on, the mains filter has reduced the noise to an S6 level, which is tolerable. This surprised me considerably, as I had expected only a slight improvement when first considering the use of such a filter.*

T. Whitlow, 124 Mount Road, Coseley, Staffs.

EXCHANGE HOLIDAYS IN ITALY

If any readers (and their wives), living in or near London, would like to have a cheap holiday in Milan, Venice or Rome, as guests of Italian radio amateurs, and who can similarly accommodate an Italian amateur (with or without wife) in exchange, they should write without delay to Francis Glynn, G3GVZ, The Mount, 13 Station Road, East Grinstead, Sussex, who is in charge of arrangements. Cost for Rome is about £22, Venice £20 and Milan £18 10s. 0d. The Italian party will be in England from August 14 to 21; the English party leaves London on August 27 or 28 and returns on September 5. Preliminary applications from individual readers or from club secretaries on behalf of members should be sent at once to G3GVZ, stating number of people interested, and whether member and wife or member alone. Descriptive leaflets are available.

MULLARD SPECIAL QUALITY VALVES

The Communications and Industrial Valve Department of Mullard Ltd. have recently made available five valves for use in airborne and similar electronic equipment where unusually severe conditions of mechanical shock, vibration and acceleration are liable to be encountered. These valves are referred to as Special Quality Valves, and they have been expressly designed to meet the high standards of reliability laid down in the current Ministry of Supply (Air) Specifications.

The five types are as follows: the M8079, a Double Diode with separate cathodes; the M8081, a Double Triode for use as RF amplifier or oscillator; an Output Pentode M8082; a High-Slope RF Pentode M8083; and a Low-Noise, High-Slope, RF Pentode M8100. These are forerunners of a comprehensive range of Mullard Special Quality Valves that are at present under development.

The new valves are electrically identical with the well-established Mullard types EB91 (6AL5-CV140) ECC91 (6J6-CV858); EL91 (CV136); EF91 (CV138); and EF95 (6AK5-CV850). They can therefore be used to replace these valves in existing equipment for the purpose of increasing its degree of reliability, or they can be incorporated in new designs where the utmost dependability is desired.

One of the principal difficulties in developing valves of this kind is to reconcile the apparently opposing demands of Special Quality and large-scale production. This problem has, however, been overcome by introducing many entirely new manufacturing techniques. Increased mechanisation, for example, has made it possible to reduce variations in quality due to differences in human skill. As regards processes such as valve assembly that cannot be mechanised, special care is taken in the selection and training of operators.

The mechanical construction of Mullard Special Quality Valves has been made strong and rigid by the use of thick, close-tolerance micas, double "getter" supports, and a special type of grid assembly designed to resist "see-sawing" when the valve is subjected to vibration. To ensure reliable operation in service, the valves are mechanically and electrically tested under conditions of extreme mechanical shock and vibration.

LIGHT-WEIGHT ACCUMULATORS FOR ROYAL TOUR RECORDINGS

Those who have been following the progress of the Commonwealth Tour of H.M. The Queen and H.R.H. The Duke of Edinburgh, broadcast by means of recordings in the News and in special programmes by well-known BBC commentators, will appreciate the excellent quality of these recordings. Many of them were taken on E.M.I. type L2 Tape Recorders which, for ease of portability, incorporate a 7.5 ampere hour type H705/7.5/3 Venner Lightweight Silver-Zinc Accumulator weighing only 40 ounces.

DIRECT SUBSCRIPTIONS

Our non-subscribing readers are reminded that *Short Wave Magazine* can be obtained from us by direct subscription—guaranteeing despatch of a copy by direct mail on publication day—at a cost of 24s. only (12s. for six months). Copies are sent flat in a strong envelope. Direct subscribers are also entitled to full both-way use of our QSL Bureau. Order (for yourself or an overseas friend) with remittance to: Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1, stating the month with which delivery is to commence, and with the address in block letters.

BACK NUMBERS

With the exception of the year 1953 and part of 1952 (mainly Vols. X and XI) we now have very few back numbers left, and the early post-war years are right out of print. Articles specially required from such issues can be reproduced by a photographic process, but it is costly business. It is always cheaper to advertise for wanted out-of-print copies through our Small Advertisement section.

VHF BANDS

A. J. DEVON

Increasing Activity—
Results and Conditions—
Some Seventycem News—
Station Reports and Claims—
Calls Heard and The Tables—

WITH more than thirty individual reports in the tray and some 40 movements claimed for the Tables, things have certainly started to go again in our VHF world. Though activity has shown a marked increase, with more and more stations appearing, or re-appearing, on the two-metre band, it cannot be said that we have had any particularly good spells of conditions. There have been fleeting opportunities, and the more favourably placed stations have always been able to work what to most people is still GDX. An outstanding instance of consistent GDX results is the G5BD/GM3EGW schedule — on the evening of April 17, they had their 100th QSO over the 240-mile path; this is, of course, not an "unbroken record" in the sense that on some occasions during the winter the link was very thin indeed. Incidentally, the ON4BZ/GM3EGW attempt arranged by G5BD on the evening of March 17 (as mentioned here last time) did produce a QSO—in fact, Guy of ON4BZ says that GM3EGW was S9+ with him on phone at a time when nearer G stations were beginning to go down in signal strength; the telephony report for ON4BZ was S7 in Dunfermline.

During the early evening of April 8, the F's were coming into the Midlands quite well; but on Easter Monday, the 19th, conditions were not nearly so good, and apparently it was only the South Coast G's who were hearing and working Continentals. At the moment of writing, we have no reports on the "R.E.F. VHF Rally" (though there are rumours of DX results in the South of France). It has always seemed to us that much better and more consistent EDX should be possible for stations situated in the Mediterranean area than has ever been reported. In those latitudes, VHF propagation conditions, for real DX working, are uniformly much better than they are in Northern Europe, and some most astonishing ground-to-ground ranges are obtained on Service VHF links. It would seem that what is lacking is organised activity and regular schedule-keeping by well-equipped stations, with an understanding of the problems and limitations of VHF working. With some notable exceptions, our French brethren seem content to rely upon /P activity for extending range—whereas the problem must always remain that of EDX from the normal home location.

Weather Report

For a general cross-check on conditions during the period, we refer you as usual to met. man G3EGB's careful and detailed analysis. By now, there are many operators who use his reports to check on their results, which of course was one of the original intentions when the weather-data feature was introduced. But we still need from individual operators their own notes and estimates as to when conditions were good—roughly, this means date and time when EDX was workable or audible, with call-signs — so that G3EGB himself has a check on the validity of his work, and we all know where we are going.

With the general increase in activity and the careful attention most VHF operators now give to met. conditions when they are wondering if it is going to be worth while looking for EDX, we hope to be able to get a useful correlation between results and conditions as the season progresses.

Seventycem News

The new 70-centimetre achievement table is beginning to look interesting, and we are glad to enter several fresh claims this month. G2HDZ (Pinner) remarks that he is spending rather more time on 70 cm than on two metres, with a total of 22 different stations now worked on the 430 mc band; he is using a CC instead of an SEO converter, and stands at 9C worked in the Table. G2XV (Cambridge) is on 435.1 mc nearly every Sunday morning, 1130-1330 clock time, looking for contacts on CW or phone, and would particularly welcome schedules during this period.

G4RO (St. Albans) writes to report himself rolling again, and puts in a nice list of 15C worked on 70 cm; he says that the path to G3IOO (Oswestry) is often open—distance, 140 miles—and they had a good CW QSO on the morning of Easter Monday. For some time G2DD (Stanmore, Middx.) has been running an early morning 70-centimetre schedule with PE1PL (The Hague); at 0730 on April 9, they made it.

Harold at G5YV (Leeds) has put in a lot of time on the 430 mc equipment and now has a 24-element stack at a height of "about 80 feet"! His nearest active 70 cm station, at the moment, is G3CCH (Scunthorpe, 42 miles), who is always S9+30 dB on 430 mc; in tuning up converters and getting the beam on the nose, Harold says that he finds the 9th harmonic of Holme Moss TV Sound a very useful test signal; it comes out on 434.25 mc and is about S4. The G5YV activity period is now 1900-2300 clock time, every evening, and 70 cm schedules with Southern stations would be very welcome.

SEVENTY-CENTIMETRE STATIONS — Twelfth List

CALL	LOCATION	FREQ. (mc)	EQUIPMENT
DL3FM	Mulheim-Ruhr	435.24	Straight PA, 32-ele stack, SEO Rx
EI2W	Dublin	432.54	Tripler, 16-ele stack, (? Rx)
G2BFT	Solihull	433.17	Tripler, 16-ele stack, (? Rx)
G2BVW	Leicester	432.60	Straight PA, 5-ele Yagi, Special Rx
G2CNT	Cambridge Airport	435.2	Tripler, CC Rx, 12-ele stack
G2DCI	Sutton Coldfield	433.05	832 Tripler, G2DD C'vrtr, 20-ele stack
G2DDD	Littlehampton, Sx.	435.6	Tripler, 16-ele stack, CC Rx
G2DHV	Lewisham	434.97	Tripler, CC Rx, 16-ele stack
G2DSP	Bognor Regis, Sx.	435.24	Tripler, 16-ele stack, CC C'vrtr.
G2DVD	Slinfold, Sussex	434.58	Tripler, G2DD C'vrtr., 16-ele stack
G2FCL	Shipley, Yorks.	433.134	Tripler 15E, G2DD C'vrtr., 6-ele Yagi
G2FKZ	London	435.95	*no details*
G2FNW	Melton Mowbray	?	Tripler, 5-ele Yagi (? Rx)
G2HCG	Northampton	434.00	*no details*
G2HDY	London, S.W.15	435.50	Tripler, CC Rx, 6-ele Yagi
G2HDZ	Pinner, Middx.	435.17	Straight PA, CC Rx, 20-ele stack
G2MV	Kenley, Surrey	435.22	*no details*
G2RD	Wallington, Surrey	435.57	*no details*
G2WJ	Great Canfield, Essex	436.00	Straight PA, CC Rx, 16-ele stack
G2XV	Cambridge	435.10	Tripler, CC Rx, 12-ele stack
G3ABA	Coventry	?	Tripler, 16-ele stack (? Rx)
G3AOO	Denton, M'cr.	433.13	Tripler, 4/4/4, CC Rx
G3AYT	Hyde, Ches.	433.13	Tripler, City Slicker, CC Rx
G3BKQ	Blaby, Leics.	434.05	Tripler, 48-ele stack, CC Rx
G3CGQ	Luton, Beds.	434.10	*no details*
G3DA	Liverpool	432.6	Tripler, 6-ele Yagi, CC Rx
G3EOH	Enfield, Middx.	436.03	Tripler, G2DD C'vtr., 12-ele stack
G3EUP	Swindon, Wilts.	433.9	Tripler, 3 stk'd dipoles, CC Rx
G3FAN	Isle of Wight	435.80	*no details*
G3FFC	Leicester	?	Tripler, 16-ele stack (? Rx)
G3FIJ	Colchester	435.18	Tripler, SEO Rx, 5-ele Yagi
G3FP	Sidcup, Kent	436.04	*no details*
G3FUL	Luton, Beds.	434.55	8012 Tripler, Stacked Slots, CC Rx
G3FZL	Dulwich, S.E.22	435.24	Doubler, CC Rx, 12-ele stack
G3GDR	Watford, Herts.	435.39	*no details*
G3GOP	Southampton	435.00	*no details*
G3GZM	Tenbury Wells, Worcs.	?	Tripler, 16-ele stack (? Rx)
G3HAZ	Northfield, Birmingham	433.59	Tripler, CC Rx, 4/4 Yagi
G3HBW	Wembley, Middx.	434.61	Tripler, 12-ele stack, CC Rx
G3HHY	Solihull, Warks.	433.93	Straight PA, 21-valve Rx, 4-ele Yagi
G3HTY	Kidderminster, Worcs.	?	Tripler (? beam array and Rx)
G3IAI	Northampton	433.80	*no details*
G3ILI	London, S.E.22	434.97	Tripler, 6-turn Helix, R.1294 mod.
G3IOO	Oswestry, Salop.	432.54	Tripler, 16-ele stack, CC Rx
G3IOR	Hellesdon, Norwich	?	Tripler, SEO Rx, 4-ele Yagi
G3IRA	Swindon, Wilts.	436.05	Tripler, SEO Rx, 8 d'ples stk'd
G3IRW	Hoddesdon, Herts.	434.43	Tripler, 2RF CC, 32-ele mesh reflector
G3IUD	Wilmslow, Ches.	432.41	Tripler, CC C'vrtr., 6-ele Yagi
G3IVF	Kirk Langley, Derbys.	433.78	Tripler, Rx various, 16-ele stack
G3JGJ	Plympton, S. Devon	436.5	832 Tripler, 16-ele stack, SEO Rx
G3JGY	Malvern, Worcs.	436.00	Tripler, SEO Rx, 12-ele stack
G3JZQ	Waltham Cross, Herts.	435.9	6J6PA, SEO Rx, 4-ele Yagi
G3MI	Chesham, Bucks.	434.13	832 Tripler, CC Rx, 10-ele stack
G4AP	Swindon, Wilts.	436.50	Tripler, CC Rx, 3 stk'd D'ples
G4CG	Wimbledon, London.	435.07	CV53 PA, CC Rx, 9-ele Yagi
G4OT	Maldon, Essex	435.240	Tripler, G2DD C'vrtr., 4/4 Yagi
G4OU	Sheerness, Kent	432.414	Tripler, Superhet, 3-ele Yagi
G4RO	St. Albans, Herts.	434.16	Tripler, 16-ele stack, CC Rx
G5CD	Hendon	435.66	*no details*
G5DS	Surbiton, Surrey	435.61	Tripler, G2DD C'vrtr., 16-ele stack
G5DT	Purley, Surrey	436.02	*no details*
G5YV	Leeds	432.85	QQVO3-20 Tripler, G2FKZ C'vrtr., 48-ele Stack.
G6CW	Nottingham	?	*no details*
G6NF	Shirley, Surrey	435.47	Straight PA, 5-ele Yagi, SEO Rx, ASB8 cavities
G6RH	Bexley, Kent	434.7	Tripler, 16-ele stack, ASB8 C'vtr.
G6YP	London, S.E.5	435.75	*no details*
G6YU	Coventry	434.10	Tripler CC Rx, 16-ele stack
G6ZP	Malvern, Worcs.	435.78	Tripler, SEO Rx, Corner reflector
G8QY	Birmingham	?	Tripler, 24-ele stack (? Rx)
G8SK	Enfield, Middx.	433.15	Tripler, G2DD C'vtr., 8 ¼-waves stk'd
G8VR	London, S.E.22	435.0	Tripler, SEO Rx, 12-ele stack
GM6WL	Glasgow, W.1.	?	P/P CV53 PA, CC Rx, 20-ele stack
GW2ADZ	Llanymynech, Mont.	432.84	Doubler SEO Rx, 32-ele stack
GW5MQ	Mold, Flints.	432.58	Tripler, 3-ele Yagi (? Rx)
ON4UV	Fayt-lez-Mange, Nr. Charleroi	434.7	Straight PA, CC Rx, 32-ele beam

This list is incomplete as regards some stations known to be equipped for the 70-centimetre band. All 430 mc operators are asked to forward details for inclusion in this Table, under the headings given.

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
64	G5YV, G6NB
61	G3BLP (630), G3BW
60	EI2W (198)
59	G3EHY
57	G2OI (349). G8OU
56	G8SB
55	GW5MQ
54	G2H1F (200)
53	G2AJ (519), G2HDZ (416), G3GHO, G3WW, G4CI, G4SA
52	G2NH
51	G5BD, G5BM, G5DS (531)
50	G3ABA, G3FAN, G6XX (238)
49	G3IOO
48	G5MA
47	G5WP
46	G2FJR, G4HT (476), G5BY, G5ML (280), G6YU (205)
45	G2XC, G6XM (356)
44	G3BK, G3CCH, G3HAZ (262)
43	G2AHP (456), G3BA, G3COJ, G4RO, G5DF
42	G3GSE (424)
41	G2FQP, G3DMU, G6CI (184)
40	G3CGQ, G5JU, G8KL
39	G2IQ, G3GBO (434), G3HBW, G3VM, G8DA, G8IL (325)
38	G2FCL (234), G3APY, G3BNC
37	G2DDD, G2FNW, G2FZU (180), G6TA (277)
36	G2HOP, G3CXD, G6CB (312) G8IP
35	G2DVD, G3FZL, G3HCU (224), G3HWJ
34	G3BKQ, G3WS (153), G8IC
32	G2FVD, G5MR (201), G8VR, G8QY
31	G3DO (204), G3HXO, G5RP
30	G3FRY, G3GOP (208), G3IRA, G5NF, GW8UH
29	G3AGS, G3AKU, G3BJQ, G3FIJ (194)
28	G3DLU, G3FIH, G8DL, GM3BDA
27	G3DAH, G3IER, G3ISA (160), G6GR, GM3EGW
26	G2CZS (100), G2DCI, G3AEP, G3CFR (125), G3SM (211), G4MR (189), G8VN
25	G3FYY (103), G5SK
24	G3FD, G3FXG, G3FXR
23	G3CWW (260), G3IUD, G4LN, G5PY, G6PJ, GM3DIQ
22	G3AGR (135), G3ASG (150), G3BPM, G3HIL
21	G2AOL (110), G3IWJ, G6XY
20	G3EYV, G3HSD, G3YH
19	G3FEX (118), G3GCX, G5LQ (176)
17	G3JMA
16	G3FRE, GC2CNC
15	G3IWA
14	G2DHV, G3CYY

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties are worked.

The Scottish VHF meeting in Glasgow on March 24 last drew an attendance of 28, being the most successful event of its kind yet held in Scotland. At centre in this group is (XYL) GM3IMR, with the following also identified: Back row, left to right — GM5VG and junior, GM3BDA (clerical dress), GM2CHN, GM2BUD, GM4PW, GM3JPF, GM3FMD, GM3INK, GM4HX, GM3FAX, GM3NG, GM3IBV, GM6WL, GM3FOW, GM3FYB, GM3EGW (glasses) and GM6XW. Front row, left to right — GM2CQI, SWL Hewitt, GM6MD, EI2W, GM3FVX, GM3IMR, GM3DIQ (chairman and organiser), GM6ZV, GM6KH and GM8AH.

G3FUL (Luton, Beds.) reports for the 70-centimetre tables, as does G2DDD (Littlehampton, Sx.), who also gives us details for G2DSP of Bognor Regis, on 435.6 mc.

There is some suggestion that several of the stations shown in our Seventy-Centimetre List are, in fact, dead on the 430 mc band —that either they no longer have the gear, or are not in any way active. Your A.J.D. can only say that all entries in this List (where full details are given) are either direct from the individual concerned, or sent in by someone else on his authority—at any rate, we have never had a disclaimer from any single operator shown in the List. It may well be true that many of these stations are not regularly active—or, indeed, that they seldom appear on the band —but the object of this list (which has been added to steadily every month) is to show stations *equipped* for 70-centimetre operation. If and when they are *active*, that should be made clear by the calls h/w lists in the Activity Report.

In this connection, we would particularly request that all 430 mc operators let us have their lists, however short, for the Activity Report; on this band, they are even more useful and important than for two metres.

Still on 430 mc—DL3FM (Mulheim-Ruhr) reports that he is on a regular daily schedule with GW2ADZ (Oswestry) "but no luck so far," conditions being very poor in comparison with those experienced during the same period last year. DL3FM has a new transmitter on 435.24 mc with a QQE06/40 in the PA running 40 watts, into the original 32-ele beam system. He has a CC converter on the way, and in the meantime is using his old 6J4-1N23-6J6-6AK5 SEO job, built last year. For the time being, DL3FM's VHF activity will be 70 cm *only*.

From Holland, PAØFB of The Hague gives the following PAØ's as regularly active: PAØFP, 434.40; PAØSK, 432.00; PAØUP, 433.25; PAØWAR, 434.68 mc. 'ØSK and 'ØWAR are on every evening, and both will shortly have 32-ele stacks. In Belgium, ON4HN is transmitting on 70 cm, but at the moment is cross-banding for reception.

After about May 15, EI2W will join the throng on 430 mc, with a 48-ele stack, a CC receiver, and a new tripler stage in the transmitter.

Scottish VHF Meeting

According to all accounts, this event—held at the Royal Hotel, Glasgow on March 24—was an outstanding success. GM3DIQ took the chair and introduced EI2W (who came over specially for the occasion) to the gathering; GM3BDA was the other speaker. On the evening previous to the meeting GM3DIQ took EI2W on a tour of the local VHF stations. A photograph of those present on this occasion appears herewith, and we are very glad to know that the evening is regarded as another landmark in Scottish VHF history.

GM3DIQ (Stevenston) reports that with him the band had been very quiet up to the end of March —except for G3BW, G5YV and

GI5AJ, all at DX distances. The new converter at GM3DIQ is going well, and so is the beam—which is four 5-element Yagis arranged in a wavelength square, giving a gain, says Clarke, of 17 dB.

GM3EGW (Dunfermline) remarks as follows: "Conditions, despite high barometric pressure, have not been very good since the opening of March 17/18; during that opening, though pressure was not very high, a temperature inversion of some 15°F developed at about 3000-3500 feet, which is quite an inversion." There is a very steady level of GM activity now and some new stations have appeared—*see* GM3EGW's list in the Activity Report—while G3BW and GI5AJ, both at over 100 miles, are as consistent with him as with GM3DIQ. GM3EGW adds that there will probably be some GM /P activity on May 9.

GW5MA/P, Pembs., Apr. 17-18

Bob's first foray of the season took place over Easter, with a total of 38 different stations worked from two sites in Pembrokeshire—this compares with 18 worked last year from the same area. His lists appear in the Activity Report, showing no less than 10 stations worked at or over the 200-mile mark, with G5BD (Mablethorpe, 245 miles) as best GDX. Some other distances are G3CCH (222 miles), G6RH (210 miles), G6XX (201 miles), and a group of stations in the London area—G2AHP, G3HWJ, G4CI, G5DS and G8OU—at around 195 miles. No EDX was heard. Bob's report reads as follows: "I started up from The Ridgeway, near Tenby, at 1545 BST on Saturday and worked right on till 0305; then back to the hotel for two hours' sleep and breakfast; off again to the Prescelly Mts. for another session from 1300 to 2030 BST on Sunday, 18th; some stations were worked from both sites."

All of which shows that these /P expeditions may be fun, but they are also very hard work—with a long and tiring journey at the wheel of the Lea-Francis to reach any worth-while GDX site, as well as the sustained effort on the air. Well done again, Bob!

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in alphabetical and numerical order).

G3DO, Sutton Coldfield, Warks.

WORKED: G2ACV, 2AHL, 2AHP, 2ATK, 2BVW, 2COP, 2FJR, 2FTL, 2FXK, 2HOP, 2NV, 2PU, 3AGR, 3BKQ, 3BII, 3BNC, 3CCP, 3CKQ, 3CIZ, 3DIV/A, 3DLU, 3EPW, 3FAN, 3FRY, 3FUM, 3GHO, 3GHS, 3GKZ, 3GVC, 3GVF, 3GWB, 3GWL, 3HHY, 3HWJ, 3IAI, 3IER, 3IOB, 3IRA, 3YZ/P, 4CR, 4SA, 5BD, 5JO, 5LK, 5ML, 5TZ/A, 5UF, 5US, 6AG, 6CI, 6FK, 6OU, 6XH, 6XY. (*March* 12 *to April* 17).

EI2W, Dublin, Eire.

WORKED: EI5Y, 9C, G3BKQ, 3DA, 3EPW, 3GPT, 3IUD, 3IWJ, 5VN/A, 5YV, 6XX, 8SB, GI3FZQ, 3GQB, GM3DIQ.

HEARD: G3FRY, 3YZ/P. (*March* 21 *to April* 19).

G3WW, Wimblington, Cambs.

WORKED: G2DJM, 2DUS, 2FJR, 2FQP, 2HCG, 2HOP, 2XV, 3BA, 3BNC, 3CGQ, 3DIV/A, 3ENY/A, 3FAN, 3FD, 3GGJ, 3HZF, 3IAI, 3IIT, 3IOO, 3YZ/P, 4PV, 5IG, 5RZ, 5YV, 6AG/P, 6FO, 8OU, 8PX.

HEARD: G2ATK, 3BKQ, 3DJX, 3DOV, 3EPW, 3FIH, 4MW, 5BM, 5JU, 5TZ/A, 5UD, 6LI, 6OU, 6RH, 6XX. (*March* 27 *to April* 18).

GM3EGW, Dunfermline.

WORKED: G2FJR, 2XV, 3BW, 3GJZ, 3IOE, 5BD, 5UD, 5YV, 8OU, GI5AJ, GM2BUD, 3ACD, 3BDA, 3DDE, 3DIQ, 3ENJ, 3FYB, 3FGJ, 3HYX, 3IBV, 3INK, 3JWS, 4HX, 4QV, 5YW, 6SR, 6WL, 6ZV, 8AH, ON4BZ.

HEARD: G5MA, GM3NG, 3FOW, 6KH, 6XW. (*March* 18 *to April* 18).

G3FYY, London, N.W.2.

WORKED: G2ABD, 2AIW, 2BPC, 2DUV, 2HCG, 2MV, 2PU, 3AGR, 3BII, 3DJX, 3FQS, 3FUH, 3GHS, 3HXS, 3ISA, 3IXE, 4GT, 5DS, 5MA, 5SZ, 5TP, 6CB, 6FO, 6SG, 6TA, 6XH, 8GD. (*March* 12 *to April* 11).

G3DLU, Compton Bassett, Wilts.

WORKED: G2BMZ, 3BNC, 3BVU, 3DO, 3FMO, 3GVF, 3HHY, 4NC, 5BD, 5YV, 8ML.

HEARD: G2FZU, 3IOO, 3IRA, 4SA, 5UF, 6NB, 8SB. (*April* 5 *to April* 8).

G3IOE, Newcastle-Upon-Tyne 3.

WORKED: G2FO, 2DKH, 2DKH/A, 3ENS, 5BD, 5YV, 6XX.

HEARD: G2DRA, 2FJR, 3WS, 6UJ, 8OU, GM3EGW, ON4BZ. (*March* 7 *to April* 16).

G3JHM, Worthing, Sussex. NGR 51/125047.

WORKED: F8OB, G2AIW, 2DSW, 2DVD, 2FTS, 2UN, 3ARL/P, 3AUS, 3AWY, 3BEX, 3BEX/P, 3DIV/A, 3EDG, 3FEX, 3GVC, 3GVF, 3IEX, 5MA, 5NF, 5TZ/A, 6NB, 6UH.

HEARD: F3JN, 3LP, 8GH, 9CQ, G2BMZ, 2DDD, 2DSP, 2HCG, 2HDZ, 2MC, 2TP, 2UJ, 3AGR, 3BNC, 3DO, 3FAN, 3GAV, 3GHO, 3HCU, 3HWJ, 3JFR, 4SA, 5DS, 5LK, 5RO, 5RZ, 5UF, 6XX, 6RH, 8OU, GC2CNC, 2FZC, ON4BZ. (*March* 24 *to April* 19).

G3FIH, Bath, Somerset.

WORKED: G2FTS, 3FAN, 3FMO, 3GNJ, 3GVC, 3HSD, 3IER, 3IRA, 3IRA/P, 3YH, 4SA, 5FF, 5TZ/A, 5UF, 8DM, GW2ACW, 5MA/P, 8UH.

HEARD: G2ADP, 2AHP, 2BMZ, 3ABH, 3AGA, 3AUS, 3BKQ, 3DLU, 3GVF, 3HWO, 3HZF, 3WW, 4GR, 5BM, 5MA, 6AG, 6NB, 6RH, 6UH, 8DL, 8OU.

GW5MA/P, Foel Dyrch, nr. Mynydd Prescelly, Pembs.

WORKED: G2AHP, 2IT, 3BA, 3BNC, 3CCH, 3FAN, 3FIH, 3HSD, 3HWJ, 3JFR, 4CI, 4SA, 5BM, 5BM/P, 5DS, 5FF, 5TZ/A, 6XX, 8OU, 8PX, GW2ACW, 3EHN, 8SU. (*April* 18 *only*).

GW5MA/P, The Ridgeway, Nr. Tenby, Pembs.

WORKED: G2AHP, 3AGA, 3AUS, 3DJX, 3GHO, 3GVF, 3HAZ, 3IER, 3IOO, 3IUD, 4SA, 5BD, 5YV, 6AG/P, 6NB, 6RH, 8OU, GW2FRB.

HEARD: G3BKQ, 5TZ/A. (*April* 17 *and* 18 *only*).

G3GHO, Roade, Northants.

WORKED: F8OB, G2ABD, 2BMZ, 2BVW, 2HCG, G3BA, 3BNC, 3DO, 3EPW, 3FAN, 3FW, 3GHU, 3GVF, 3GWB, 3HWJ, 3HXS, 3HZF, 3JFR, G4SA, G5MA, 5TZ/A, 5UF, G6AG/P, 6XH, G8VN, GW5MA/P, ON4BZ.

HEARD: G2AIW, 2ATK, 2FJR, 2FNW, 2FTS, 2FZU, 2HOP, 2KF, G3BK, 3BKQ, 3DJX, 3DIV, 3ENS, 3FQS, 3FUM, 3GHI, 3WW, G4RO, 5BD, 5DS, 5ML, 5RZ, 5YV, 6CB, 6FO, 6NB, 6OU, 6RH, 6TA, 8DM, 8OU, 8PX. (*April* 1 *to April* 18).

Some Station Reports

G5DS (Surbiton) makes progress in both two-metre tables, as does G3DO (Sutton Coldfield), who worked 54 different stations in the five weeks to April 17, some at good GDX distances. G2AHP (Perivale) has been off for a major rebuild but comes in to say "Here we are again all smiles and why not, have just worked GW5MA/P for yet another county, making the score 43C for 454S." His new exciter runs a frequency sequence of 6-18-144 mc with about 12w. into a TT15, which will eventually push an 829B. G2AHP wonders if, with all the phone working there is nowadays on the two-metre band, we shall have to institute slow Morse practice sessions to get the boys back on to the key again! It seems to your A.J.D. that the reason for so much phone being used is that, with little DX workable most QSO's have been semi-local, for which phone is quicker and more convenient; when the EDX comes in again, and the GM's appear in the South of England, the DX operators will assuredly be back on CW for most of their contacts.

G3FYY (London, N.W.2) is on again after a lot of rebuilding; he finds the 5763 much better than a QVO4-7 as a doubler 72-144 mc; his new converter is 12AT7 g.g.t.-mixer, with a 12AT7 osc.-dblr. and EF91 IF amplifier. The

result is a very low-noise job on which an S1 phone signal can be read provided it is fully modulated. G3DLU (Compton Bassett, Wilts.) has been inactive, but having visited G3AUS in Torquay, is trying an interesting 6J6 mixer arrangement suggested by the latter; in this, the plates are strapped and by-passed to earth, the signal is fed to one grid through 50 $\mu\mu$F with a 6-megohm leak, and the oscillator injection is straight into the second grid, with IF taken from a 50,000 ohm cathode resistor; there is no tuned IF winding provided, and the circuit is claimed to be very low-noise even if the gain is less than unity.

G3IOE (Newcastle, 3) is back again "with something to write about." It is that from his hollow-in-the-hills he has, since the middle of March, been able to make some good contacts, and has heard G3WS, G8OU and ON4BZ —all rare and difficult DX to G3IOE. G5BD and G3ENS have been worked, and at times GM3EGW is a strong phone signal with him, "readable on the speaker"; best direction from the G3IOE location is towards LA, so he has hopes of reaching over to Norway when conditions serve. Researches with converters still go on, and in due course the PA will be a new 120-watt job.

G3IER (Cheltenham) notices increased activity, and has worked eight new stations, including GW5MA/P; another /P worked is G3YZ, a local newly on two metres, who went out portable within a week of his first-ever contact on two metres! G5MR (Hythe, Kent) raised G6FO (Maids Morton, Bucks.) recently for his 201st station, the 200th being G3BII of Beaconsfield, and also Bucks; that is noteworthy simply because G5MR is at the sort of location—on the coast and completely screened to the North—from which working G's at any distance is a long and patient business.

From Worthing, G3JHM reports many F's heard or worked, as well as the two GC's, '2CNC and '2FZC; on March 28 he got his 14th county with G3AUS, and on April 8 G6XX (Goole, Yorks.) was RST-569 in Worthing; G3JHM is trying a cascode, and finds it an improvement over the old arrangement. He is one of those very well placed for the Continentals, and we look forward to getting lots of news from him as the season goes on.

The new beam at G3GHO (Roade, Northants.) consists of two skeleton slots with two reflectors fed with 80-ohm line through an impedance-matching transformer and, says Bernard, "up to date it seems reasonable." At any rate, on April 8 he worked F8OB (Gournay, S-Inf.), G2BMZ (Torquay) and ON4BZ (Brussels), for solid QSO's. G3GHO is disappointed with the general level of activity and thinks that some of the two-metre fraternity do not altogether deserve the support and co-operation that they get!

G5YV (Leeds) finds EI2W a "tremendous signal" on the latter's new 32-ele stack for Scandinavia; Harold is now level-pegging with G6NB in All-Time counties (GW5MA/P for Pemb., needless to say) and is nicely out in front in Annual counties. Referring again to the Holme Moss TV Sound harmonics (*see* "Seventycem News") the third at 144.75 mc is a very useful "local signal generator" for lining up on, as it is a good S9 in Leeds; after that, of course, it simply becomes QRM!

G2XV (Cambridge) advances in Counties and Countries (with GM3EGW now worked) and G3WW (Wimblington, Cambs.) mentions March 27, 28 and April 8 and 9 as good nights; some interesting signals heard include G3YZ/P and G5BM/P, both in the Cheltenham area, on April 18, and G6AG/P near Stratford-on-Avon. G3WW has been running a series of comparison tests between his 5-over-5 and two skeleton slots; on both transmission and reception the 5-over-5 is one S-pt. better, which is what was expected and in accordance with G2HCG's own figures; the advantage of the slots lies in their lightness, simplicity of construction, low windage and wide aperture. And it is an easy matter to put up a stack of four to get an even greater gain.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
22	G3BKQ
15	G4RO
13	G2XV
9	G2HDZ
8	G3IOO
6	G5YV
5	G3FUL, G3IRW
4	G2DDD, G2HDY

On working four Counties or more on the 70-centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

G8OU (Ashtead, Sy.) writes after a long silence and is adjusted to his rightful place in All-Time counties—he remarks that "new ones are awfully hard to come by these days." (Well, what do you expect when you've got 57!) It may not be generally known that for a long time now he has been running a regular lunch-time schedule with PE1PL, which has hardly ever failed—in spite of being from a London office, using relatively low power, and with a very high local noise-level. (During PAØFB's recent visit to this country, he went to see G8OU at the office and was himself able to work PE1PL on the schedule).

G3IRA (Swindon) has new /P gear, screen modulated on the G3MY pattern, which he says "goes extremely well." The transmitter section is EL91-EL91-832. and the receiver is RF 6AK5. mixer 6AK5, 955 osc., 9003 IF amp., 9003 detector; the ingenuity of the arrangement is that the modulator is used as the LF section of the receiver.

From Jersey, GC2CNC reports April 8 as sounding a good evening with him, with F8GH, F8OL and G5TZ/A very strong signals; so far, GC2CNC has not even heard GC2FZC (Guernsey), who on a clear day is within optical range!

From Outside U.K.

We have several interesting

reports this month. EI4E of Killarney, Co. Kerry, has a 5-stage transmitter for two metres, with an 829B in the final; his aerial is a 5-element Yagi at 28 feet; and he has two receiver units. *But* there are no other VHF stations locally, he is hemmed in by "mountainous terrain," and we gather that as yet he has had no contacts. This is surely a matter which could be rectified with the co-operation of EI2W.

Henry of EI2W (Dublin) also writes; with him, conditions have been very poor for DX working, "despite a 10-day period of consistently high barometric pressure." On Easter Monday, EI2W spent the day trying to get through to the F's on their "VHF Rally"—but the only signal heard from a southerly direction was G3FRY (Cheltenham). We have a very nice photograph (to appear next month) of the EI2W 32-element fixed beam aimed on Scandinavia; Henry has put in, single-handed, nearly three months of his spare time in building it; and now he is looking for the contacts. Well, all VHF operators will wish him luck in this undertaking and hope that his trouble and enthusiasm will be rewarded by QSO's with LA, OH and SM as soon as an opening develops—and there is no reason to suppose that there will not be opportunities during the coming season.

News of other EI's is that EI5Y is on from Dublin, on 144.198 mc with a 12-element stack; also EI9C (Glasnevin, Co. Dublin) on 145.89 mc.

Expected on the two-metre band are OH2OK (Helsinki)—who was on in 1949 and made the first OH/SM contact with SM5VL—and OH2OP, also in Helsinki; OH2NY (Helsinki) and OH5NM (Imatra) are reported to be already active, the latter on 144.00 mc dead. Tests between EI2W and OH2OK are to start during the latter part of May, and Henry will keep us informed of frequencies. All this adds up to a very interesting new EDX possibility, as OH is the only Northern European country which has not yet been worked on two metres.

ON4BZ (Brussels) says that VHF conditions have been poor over there, too, the evening of March 17 (his QSO with GM3EGW) being the only decent spell since the New Year. PAØFB (The Hague) gives us some news of PA activity and greatly regrets that he missed the Cheltenham VHF Meeting (he was in England at the time); apart from PE1PL, there are several Dutch stations regularly active on 70 cm (as already mentioned), and an interesting new one on Two is LX1SI, 144.72 mc, who has worked PAØBN and PAØROB. LX is another country not yet worked from the U.K., and if LX1SI is a good station he is well within the range of possibility.

DL3FM (Mulheim-Ruhr) says he has not a lot of time for radio just now, as he is at Bonn University "where I am doing a bit as a biologist" working for a degree. However, he sends a lot of useful information about DL activity and DL "Firsts"; in his lists we notice another Luxembourger, LX1DU, as having made the first DL/LX contact with DL3NQ, early this year.

Mystery Man

Our tail-end report this month is from a correspondent whose call-sign we cannot mention—because we don't know who he is! It was bound to happen sooner or later—a claim for Annual Counties, a calls heard-and-worked list, a total of stations worked—with no covering letter, and no name, address or call-sign anywhere in the sheets to give a clue to the sender! Your A.J.D. does not even recognise the writing, which sometimes in the past has provided the solution to similar mysteries. So would the gentleman concerned kindly step forward—in the meantime, all we can do is to hold the report till we know who he is!

VHF Century Club

The only new member for this month is G3AGR (London, S.W.16), who receives Certificate No. 168. All VHF operators who have worked 100 or more stations on the bands from 50 mc (6 metres) up are eligible for membership of the VHF Century Club on production of the necessary QSL cards; these should be sent in, *with a check list*, and if all is in order, in due course the Certificate is issued and the cards returned under separate cover.

Warning — Aircraft!

It has to be remembered, as most VHF operators will know, that the 144.0-145.0 mc section of our two-metre band is *shared*, and our operation is "subject to non-interference with Government services in this band."

There has recently been an

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1953

Starting Figure, 14

Worked	Station
49	G5YV
44	G3GHO
43	G4SA
42	G6XX
40	G3IOO, G5MA
39	G3WW
35	G3EPW, G5DS
34	G2DVD, G2FJR, G2XV
32	G2AHP, G5BM
30	G3DO, G5ML
29	G3IRA
28	G2DDD
27	G3CUZ
26	G2FCL
25	G3WS
23	G2CZS, G2HDZ, G3FYY
21	G3JFR, G4RO
20	G5MR, G8VN
19	G3FUW, G6TA
17	G3IER
15	G2AOL
14	G3FIJ, G3JHM

Note: This Annual Counties Worked Table opened on September 1st, 1953 and will run for the twelve months to August 31, 1954. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additions claimed need show only stations worked for each county as they accrue. QSL cards are not required for entry in this table.

eruption of aircraft working in this area of the band and (it is understood) complaints about interference by amateur stations; there may even be action through "the usual channels" and, if this does happen, the operators concerned will hear about it. The probability is, however, that very few, if any, of the operators who are alleged to have caused interference would be aware of it, because use of these frequencies in our band is only occasional, the aircraft using them only pop up for a second or two, and nobody is really clear as to what is happening. In other words, you can listen for hours without hearing anything on your channel—and then it can happen that an aircraft comes up while you are transmitting: the trouble is that the aircraft hear far more than the ground stations, which in the ordinary way cannot receive each other. It might well be that some of our transmissions *are* on the channels of Service ground-stations that are not in regular use. This makes it very difficult for the amateur concerned, who can really only wait till he is told that he is interfering—there is no other way for him to find out.

However, those who are in, or likely to be in, this sort of trouble can take heart: Your A.J.D. spends a good deal of time listening round on VHF, not only on the amateur bands, and a short time before writing this heard an aircraft fighting it out with a police transmission (not in, but near, the two-metre band) with allegations on both sides far more serious than those likely to be made about any amateur, who would naturally shut down immediately an aircraft complained of interference.

But we still have to remember that the 144.0-145.0 mc area is shared, and that the pressure on VHF ether space may well be driving more Service stations into this band.

In Conclusion

With VHF activity well on the increase again, we look forward to an interesting and profitable season for the practitioners on both bands. To maintain the reliability and usefulness of this feature, as well as accurate records—which one day may be very important—all who read these lines are asked to send in a regular report; all those received are credited, and it is fair to say that the status which has been acquired over the years by "VHF Bands" is due to the support of a large body of readers, without whose interest and co-operation such an outcome could never have been achieved.

Dead-line for next month is **May 17 latest,** with everything addressed to: A. J. Devon, "VHF Bands," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Here again on June 4, all being well.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

15	G4MW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM). G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM).
14	G3GHO, G5YV, ON4BZ
13	G3BLP, G3CCH, G5BD, G6XX
12	G2HDZ, G2HIF, G2XV, G3WW, G6LI, G6RH.
11	G2AJ, G3ABA, G3IOO, G4RO, G5UD.
10	EI2W, G2FQP, G3BK, G3EHY, G3GHI, G3HAZ, G4SA, G5DS, G5MA, G8IC, GW5MQ.
9	G2AHP, G3BNC, G3FAN, G3FIJ, G6XM, PA0FB.
8	G2XC, G3GBO, G3GSE, G3HCU, G3VM, G3WS, G5BM, G5BY, G5ML, G5MR, G8SB, GM3EGW

LOW-CAPACITY VARIABLE CONDENSERS

The Plessey Co., Ltd., Ilford, Essex, now offer a range of midget and miniature air-spaced variable condensers, constructed on ceramic bases and designed to meet the highest standards. These were shown at the recent R.E.C.M.F. Exhibition. Some examples are: Capacity swing 6-16.5 $\mu\mu$F with a minimum of 3 $\mu\mu$F; capacity swing 3.0-8.5 $\mu\mu$F, with a minimum of 1.5 $\mu\mu$F. Also shown by Plesseys were a range of inexpensive wire-wound potentiometers rated at 3 watts, as well as the moulded track low-noise 2-watt type,

RADIO ALTIMETER AT PHYSICAL SOCIETY EXHIBITION

Salford Electrical Instruments, Ltd., displayed their Radio Altimeter Mark V, Stage B, at the Physical Society Exhibition. This altimeter, when installed in an aircraft, indicates its actual height above the terrain below within extremely close limits. The altimeter operates on a somewhat similar principle to that used in radar devices, but, instead of a series of pulses being sent out, a continuous wave is radiated, the frequency of which is varied repeatedly in a sawtooth manner. The time-delay of the reflected wave enables a direct measurement of height to be made. The altimeter is designed so that two height indicators are available—one for the pilot and one for the navigator. The instrument is accurate to ± 10ft. at 200ft., and to within 3% of the indicated height up to 5,000ft. Where required, a height can be preselected, a visual indication being given of any deviation from this height. The power consumption is approximately 130 watts, the nominal input voltage being 24 volts DC. The transmitter/receiver unit and indicators are pressurised.

XTAL XCHANGE

Readers are reminded that offers for crystal exchanges can be accepted for free insertion under this heading. This applies only to *exchanges* of crystals. Details should be given in the form shown on p.730 of the February issue of *Short Wave Magazine,* and headed "Xtal Xchange — Free Insertion."

"TWO-BAND VHF RECEIVER"

The concluding part of this article—by G2BVW on a 144/430 mc receiver—will appear in the June issue of *Short Wave Magazine.*

VHF WEATHER REPORT

PERIOD MARCH 20 TO APRIL 16

A. H. HOOPER (G3EGB)

TWO VHF DX spells this period put a firm end to the Winter hibernation. The first occurred late in March in a ridge of high pressure which intensified as it approached us from the WNW on the 26th. Passing over the U.K., it then slowed down and faded away over the northern slopes of the Alps. Its motion was slow enough to yield two evenings of DX mainly to the SE-SW-NW directions. On March 31 a large anticyclone centred over the western part of W9 began to move in an easterly direction. Crossing the Atlantic, it settled down to our SW on April 6, forming part of a long, narrow high-pressure belt extending from beyond the Azores over the U.K. to Scandinavia. Although this particular anticyclone soon collapsed and lost its identity, the overall high pressure belt (a pattern which became familiar to us last season) remained with minor fluctuations until April 12, when a series of weak fronts passed over us.

One wonders whether the anticyclone developed a reflecting layer while over the United States. If so, then centred over W3 on the evening of April 1, it would have produced DX along the Atlantic seaboard after a day of extended working inland to W8 and W9. For the last few days we were on the extreme edge of an anticyclone to the west, and although a well-marked layer developed, it was a long, narrow belt lying mainly SW-NE, as brought out in Table I discussed below. With a static situation like this just before the Easter holiday, it is tantalising to wonder just what future developments will be and whether they will help the various expeditions that have been organised.

Anomalies in VHF propagation occur when the radio refractive index of the atmosphere exhibits a sharp change (discontinuity) with height. When the sharp change follows the general trend of a decrease with height, then a scattering downwards of part of any incident radio energy can occur. For the spectacular forms of DX, we look for this surface of discontinuity extending in a layer over large areas. It can, loosely, be regarded as a reflecting surface. The results of radio soundings reported in *The Daily Aerological Record* of the Meteorological Office, London, have been studied so as to deduce the presence of reflecting layers. The result of this work is summarised in Table I, which shows for the more important directions from S.E. England those occasions when DX is thought to have been possible by this means. Country prefixes and a simple code give an idea of the far limit of each opening. Exceptionally good occasions are printed in heavy type and are underlined. The two-day spell about March

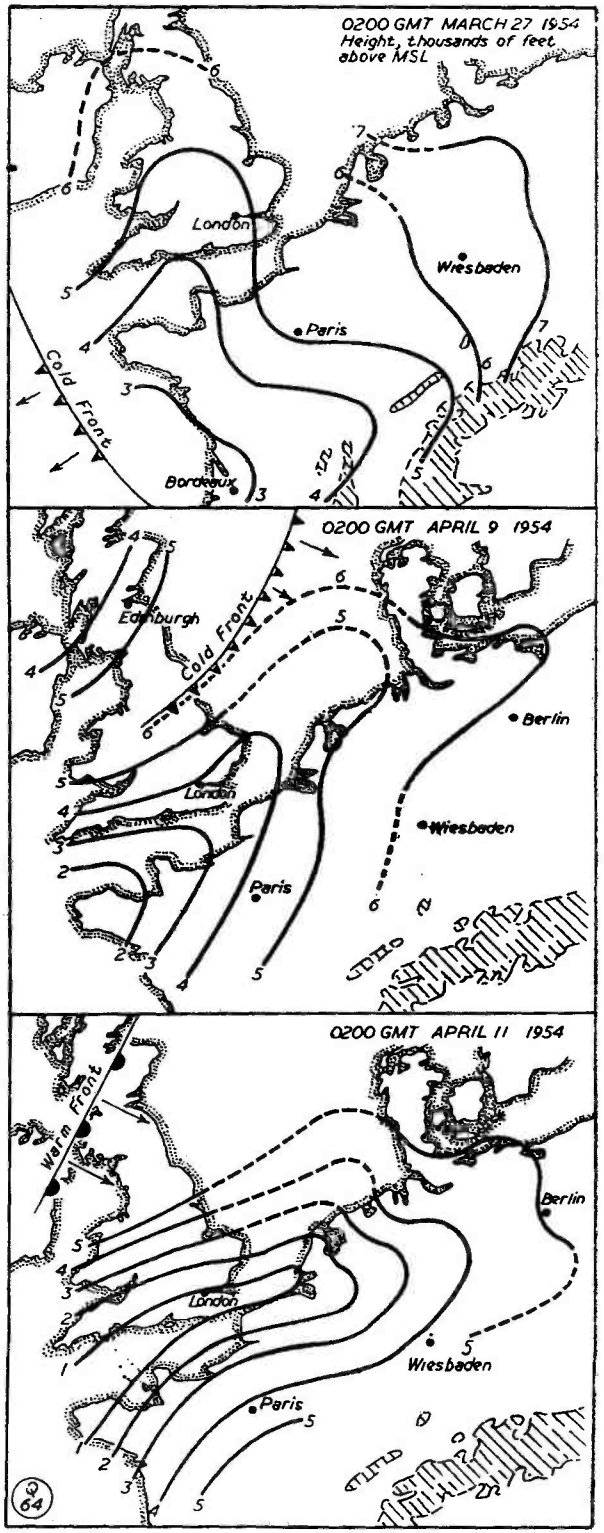
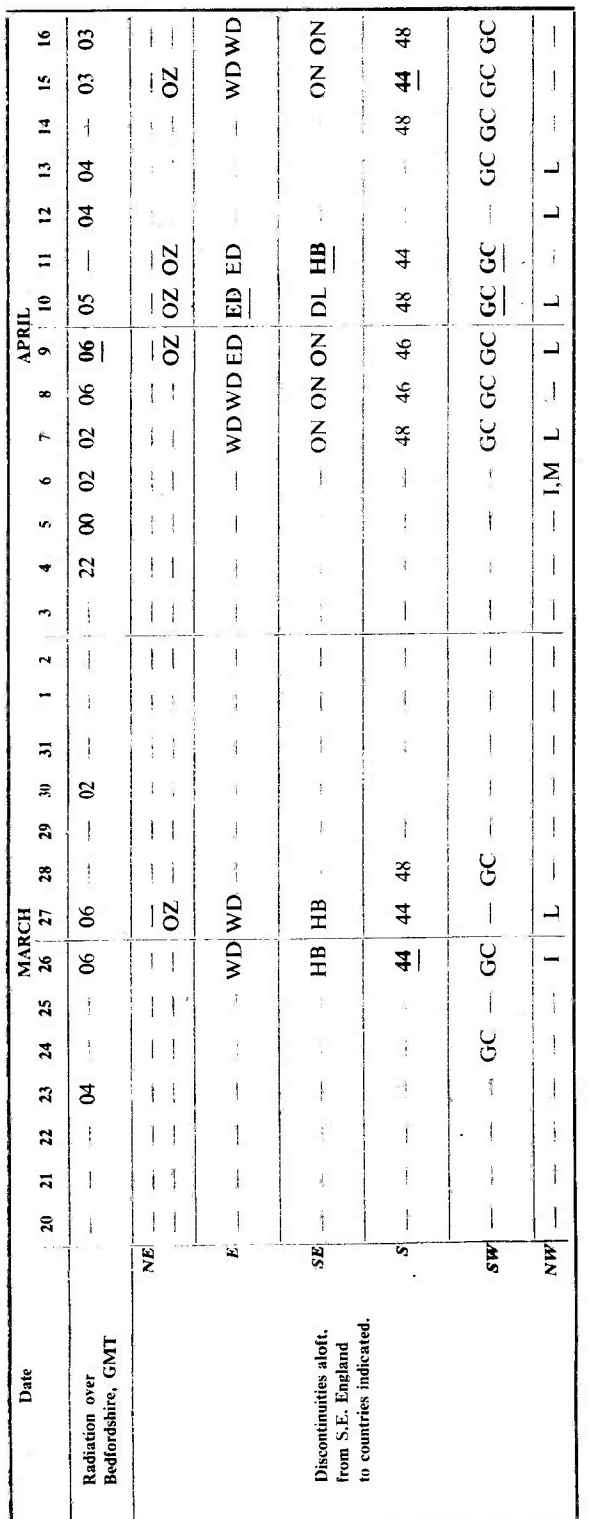


Fig. 1. These charts show the refraction discontinuities that developed during this period. VHF reflection from the first one is mainly to the South and South-Easterly directions, probably when there was little activity to exploit the possibilities. The second shows how even a weak cold front can break up a reflecting layer. For a warm front the break-up usually occurs in advance of the front, as in the lower sketch.



The possibilities for EDX and GDX from March 20 to April 16. Especially good dates are shown in bold type and are underlined. Country prefixes show approximate direction and distances from S.E. England to which good conditions are thought to have extended.

Table 1

Notes:—(1) *Conditions listed are for the evenings of the dates shown.*

(2) *Figures in the first line are the times when inland super-refraction had reached its peak.*

(3) *Country prefixes indicate the approximate limit of good conditions.*

(4) *Sub-divisions of distance have been necessary, thus: ED = eastern DL, WD = western DL, L = Lancashire, I = GI, and M = GM. (Sometimes paths to I and M are open together).*

(5) *For the southern path degrees of latitude are given.*

(6) *Paris is about 49° and Marseilles about 43°N. Particularly marked discontinuities are in heavy type and have been underlined.*

26/7, for example, shows the possibility of working far to the South (latitude 44°N) and South-West (Switzerland), but only limited working to the East. In contrast, the spell April 7-11 gave an opening to the North-East, East and South-East, but with limited extension Southwards.

Chart Interpretation

The charts of Fig. 1 show, as far as can be ascertained, the layers that existed on certain selected occasions. For the dates in question they give the complete situation. This can be compared with the summary of Table I.

The first can be regarded as applying to the evening of March 26. This layer was associated with the ridge of high pressure mentioned in the first paragraph. The centre of this pressure system was over the Bristol Channel at the time of the chart. The reflecting layer can be seen, therefore, to be displaced well ahead of the system and travelling south-eastwards. Because of this motion, one would expect anomalous propagation of a fluctuating character instead of the steady signals often experienced.

The second chart (evening of April 8) has been included to show that a cold front, even when weak in terms of the weather it produces, can serve to break up a reflecting layer. A further layer has formed behind it. It will be seen that the break-up is mainly behind the surface position of the front.

Finally, the last chart shows the arrival of a warm front which adversely affected anomalous propagation conditions well ahead of it.

Our other main source of extended propagation is by means of radiation cooling on cloudless evenings. This increases the downward bending of radio waves and so extends the radio horizon. It is an effect confined to land areas and so assists us mainly in GDX. The effect begins as the sun sets and then develops over a period of hours, sometimes all night long. The first line of Table I suggests the

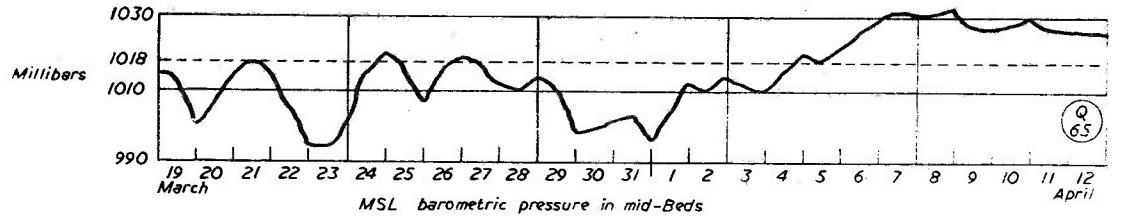


Fig. 2. The pressure graph reached 1018 millibars for four periods during the month — but not all of them coincided with EDX. On certain occasions the value was only just exceeded; even so, EDX conditions developed for one of these.

time (GMT) when development ceased and the effect reached its maximum. Where times are after midnight they are entered under the previous evening. The night of April 9/10, for example, was the best, with cooling continuing until dawn.

The usual pressure graph is continued in Fig. 2 and the value 1018 mb. dotted in. We do not, from last year's experience, expect VHF DX below this value, and to that extent pressure readings are helpful, but barometric pressure is really an inadequate guide, as it can be well above this value with no DX at all. The March 26 opening was with a pressure of 1019 mb., and so we cannot improve matters by increasing this "critical" value.

As a matter of interest, the whole area depicted in the last two charts of Fig. 1 experienced barometric pressure greater than 1018 mb. for both occasions, so that this, as an indication, would imply A-P over the whole of the area!

The correlation of last month's assessment with last month's results is encouraging. It is surprising, after last year's early start, that the first opportunity this year for EDX was not fully exploited. Perhaps with things stirring up, this month's chances have been grasped.

Permission of the Director, Meteorological Office, to make use of information gained from the publications referred to is gratefully acknowledged.

Case of TVI

HISTORY OF AN INCIDENT

A. G. WOOD (G5RZ)

While this article does not set out to find the answer for every problem of TVI—indeed, it does not often happen that the solution in one case is good for another — our contributor's experiences will suggest several lines of approach for those involved in a TVI situation of their own. And in any case the first objective should be to get the afflicted viewer's willing co-operation in finding the solution.— Editor.

IT would seem that many problems of TVI could have been avoided had manufacturers got together in the first instance and agreed upon a series of recognised local oscillator and intermediate frequencies.

As things are, it is safe to say that no two cases of TVI are identical in every respect, having regard to the psychological and technical problems involved. However, certain basic principles seem to apply and the following account of how just one case has been successfully overcome by a combination of goodwill, commonsense and some slight technical knowledge may serve to render a modicum of assistance to others placed in a similar situation.

The frustrated TV viewer reacts in a very similar manner to the outraged motorist, and for a few moments it is touch and go whether or not murder is to be committed! But if, by application of tact, the blood pressure is given an opportunity to subside it will generally be found that he is a perfectly normal individual to deal with. Hence, the first move is all-important.

The present case arrived, out of the blue, after nearly two years' trouble-free operation on two metres, with no QRM either to the home TV receiver or, so far as is known, to any other receiver in the district, all of which take their picture from Alexandra Palace, operating double side-band on 45 mc. Since all amateurs are automatically blamed for every form of interference, ranging from the next-door's washing machine, through car ignition to aeroplane flutter, it could safely be assumed that, up to this point, the transmitter had not been causing any trouble.

But it came, in the form of a sudden telephone call from a neighbour situated some 75 yards away who had recently been observed to have installed a TV aerial.

The Symptoms

Tests quickly established the fact that he was, indeed, obtaining a herring-bone pattern on his screen when the transmitter was operating. At this point, blood pressure reduction was rapidly achieved by a sincere apology, an explanation that the home set was functioning free of any interference and that his trouble could be due to an unfortunate combination of circumstances. Finally, an assurance was given that two-metre operations would be suspended during TV hours until matters had been sorted out—this assurance was followed by a request for some measure of co-operation.

The first hurdle over, the next step was to ascertain the make and type of receiver in use, the name of the dealer and with this information in hand to find out the IF and local oscillator frequencies employed.

The next move was to determine which stage in the transmitter was causing the trouble. By a process of elimination, starting with the beam array; and working backwards, stage by stage, it was found that the QRM persisted right back to the oscillator-tripler stage. That is to say, there was no appreciable difference in the nature and extent of the interference between full radiating conditions and with the exciter stage running alone and entirely disconnected from any intentional radiating system. It should be stated that the exciter consisted of a 6V6 with an 8 mc crystal tripling to 24 mc, in the output. This was followed by an EC52 doubling to 48 mc, a QVO47 tripling to 144 mc, with an 832 straight amplifier into an 829B final, running at about 50 watts input.

Approach to Manufacturer

Unfortunately, in the case under discussion no dealer was involved, the owner of the set having undertaken his own installation. However, a telephone call to the actual manufacturers, who run a special interference section, bore fruit. They very willingly produced the information that the IF was 14 mc and the local oscillator 31 mc, and further hazarded a guess that the trouble might be due to IF break-through. They then offered to send up, free of charge, a 14 mc two-stage filter for test and finally suggested that if this did not effect a cure they would be agreeable to send along one of their engineers to help clear the trouble. This very co-operative attitude, incidentally, might well serve as a model to all TV set manufacturers.

With the necessary information available steps were then taken to try and sort out the reason for the interference.

There were five possibilities:

(1) Direct interference with the 45 mc signal.

(2) IF break-through on 14 mc.

(3) Beats between the crystal oscillator or one of its harmonics and the local oscillator in the TV receiver.

(4) Beats between the crystal oscillator or one of its harmonics and a *harmonic* of the TV local oscillator.

(5) Image frequency response.

In the present instance it seemed unlikely that (1) was the trouble, since no interference was visible on the screen of the home receiver situated far closer to the source of interference.

It should be borne in mind that the IF of a TV receiver is by no means selective, as in a BC receiver, or more so as in a communications receiver. On the contrary, it is usual for the various IF stages to be staggered about a mean frequency so that the over-all response is quite broad, covering a band of about 4 mc or so. Consequently, in considering (2) an IF of something like 12·5-15·5 mc should be suspect.

The image frequency response under the given conditions in this case would be 31 minus 14 mc, or plus or minus 17 mc. This also seemed unlikely to be responsible since the acceptance of circuits tuned to 45 mc at the front end would hardly be likely to extend to 17 mc.

Once again, therefore, by a process of logical elimination, the cause seems to be narrowed down to either (3) or (4).

At this point it is as well to procure pencil and paper and to set down all the various frequency combinations possible, and, in relation to the information already known, to analyse the various possibilities.

The Frequency Relationships

Consider first the crystal oscillator on 8 mc. Here we have 8-16-24-32-40-48 mc and so on. 16 mc is quite close to the IF acceptance range, but its actual strength as measured on the communication receiver S-meter seemed too low; 48 mc might have caused direct interference with the picture, but here again it was quite weak, and in any case, as previously stated, no trouble was being experienced on the (much closer) home receiver.

Let us move on, therefore, to (3) and examine

the beats produced. These, all in megacycles, were:

31 − 8 = 23	31 − 24 = 7
31 + 8 = 39	32 − 31 = 1
31 − 16 = 15	40 − 31 = 9
31 + 16 = 47	48 − 31 = 17

The suspect beats in this case are those occurring at 15 mc and 17 mc, the former being within the IF range and the latter corresponding to the image frequency.

Before jumping to conclusions, however, it is as well to examine the remaining possibility of (4), and in this case we can consider the following frequency (mc) relationships:

62 − 8 = 54
62 − 16 = 46
62 − 24 = 38
62 − 32 = 30
62 − 40 = 22
62 − 48 = 14

The suspect beats in this case are those occurring at 46 mc and 14 mc, the former being well within the band-width of the vision and the latter occurring right in the middle of the IF range of the receiver.

Finding the Cure

Having regard to the very weak 16 mc component emanating from the oscillator suspicion centred on the 48 mc harmonic; acting on this assumption steps were then taken to effect a cure, if possible, without going to the trouble of screening the transmitter completely. Moreover, it was considered desirable to retain the 8 mc crystal for fear that any change here might simply mean "out of the frying pan into the fire" and would lead to a fresh outbreak of trouble from those TV receivers in the locality not involved.

The first stage was to reduce the oscillator HT supply to the lowest possible point consistent with adequate drive to the following stage. The next was to change the multiplier sequence from 8-24-48-144 to 8-24-72-144, so as not to encourage the (presumably) troublesome 48 mc component. This was quite easily achieved by changing the size of the anode coil in the EC52 and retuning until 72 mc was struck. At this point the viewer was asked to furnish a report under actual viewing conditions. (A small point here—let him choose a time corresponding to a programme he does *not* want to see!) In this case the report was encouraging but not entirely satisfactory. There was still some faint pattern left, which was, after all, to be expected since the set-up of the first stage had only been modified by a reduction in input.

By this time the viewer was entirely co-operative and willingly agreed to the trying out of a wave-trap in his coax feeder. A lash-up was therefore prepared which would cover the range 45-50 mc, and with the transmitter left running it was installed and trimmed. It was found that the interference could be completely eliminated at one setting—which was presumably 48 mc—with only a slight drop in picture brilliance, and this could very easily by taken up on the gain control. Finally, the lash-up was converted into a presentable filter, consisting of 9 turns of No. 16 SWG tinned copper wire of $\frac{5}{8}$" diameter soldered firmly across a 50 $\mu\mu$F trimmer, housed in an aluminium box of 2" cube with coax connectors at each end and provision for the insertion of a trimming tool.

Conclusion

A final test was then undertaken with the transmitter in a fully radiating condition and under the critical eyes of the whole family, who expressed themselves entirely satisfied.

The whole matter was thus brought to a satisfactory conclusion in perfect harmony and in a most cordial atmosphere.

The reason why interference was caused at such a distance and with such low power is still something of a mystery, but one possible explanation is that power leads pass through the shack (not in conduit) within a foot or two of the operating bench, and thence continue down the garden on overhead poles, terminating in heaters installed in a greenhouse. The nearest point between these leads and the viewer's aerial is a matter of, perhaps, 20 yards, and, but for the trouble involved, it might have been interesting to determine whether these lines were responsible for conveying and re-radiating the offending harmonic.

CURING LAZY CRYSTALS

It was found that several home-ground crystals, although otherwise quite active, showed a certain reluctance to oscillate when keyed. They were of the type in which the electrodes have small "lands" in each corner to provide air gaps. The trouble was traced to slight unevenness in grinding, which caused the crystal faces to touch the electrodes near the centre. A piece of paper about $\frac{1}{4}$" square was folded and placed over one edge of the crystal, so that small wedge-shaped air gaps were formed between the crystal and each electrode. The result was a perfectly keyable crystal, and the device has since been used successfully on other "lazy" home-ground crystals. It should be emphasised that the method should not be applied to commercial crystals. (G3ETH).

NEW QTH's

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

DL2VM, 22265552 Sigmn. Akehurst, J., Berlin Signal Squadron, B.A.O.R.2.

EI6K, T. Fay, 3 Frankfort Cottages, Amiens Street, Dublin.

G3AKP/A, F. Monk, c/o 59 James Street, Coalville, Leicester.

G3CVF, D. Pidgeon, 4 Frome Avenue, Wool, Dorset.

G3HFA, R. Cairns, 72 Maple Street, Ashington, Northumberland.

G3ICR, J. Willmott, Lighterage Dept., Port of London Authority, Millwall Docks, London, E.14. *(Tel.: ROY 2000, Ext. 94295).*

G3IFD/A, T. Carlisle, c/o 205 Runley Road, Luton, Beds.

G3ILB, D. S. Kendall, 40 Aberdale Gardens, Potters Bar, Middlesex.

G3IZS, W. H. Scotton, 20 Duchess Street, Leicester. *(Tel.: Leicester 62892).*

G3JHT, J. F. Waller, 106 Graham Gardens, Luton, Beds.

G3JIR, J. A. Hardcastle, 38 Cedar Grove, Sefton Park, Liverpool, 8.

G3JJI, Sgt. F. T. Hawes, L-67 M/Qtrs., R.A.F. Station, Boscombe Down, Amesbury, Wilts.

G3JJL, L. Devenish, 13 Riverside, Hendon, London, N.W.4.

G3JKH, N. J. Storrs, 3 Chevinedge Crescent, Exley, Halifax, Yorkshire.

G3JKQ, D. P. Gyles, The Gables, Bure Lane, Mudeford, Christchurch, Hants.

G3JKX, M. J. Street, 277 King's Road, Rayners Lane, Harrow, Middlesex.

G3JLZ, V. J. Ludlow, 11 Marriott House, Catford, London, S.E.

GM3JNW, H. L. Fleming, B.Sc., 45 Ochil Street, Alloa, Clackmannanshire.

GI3JOV, J. R. Wilson, 9 Florence Street, Rosemount, Londonderry.

G3JQD, D. A. McBright *(ex-ZB1RM/MD5RM),* 3, Sydney Road, Richmond, Surrey.

GM3JQL, J. S. Haggart, 24 Hammerman Building, 35 Dunkeld Road, Perth.

G3JQZ, J. W. South, 22 Washington Avenue, Bournemouth, Hants.

G3JRH, P. R. Horne, 130 Kenilworth Road, Edgware, Middlesex.

G3JRM, Rees-Mace Marine Amateur Radio Club, School Road, Oulton Broad, Lowestoft, Suffolk.

G3JRX, K. Boddy, 4 Colwall Avenue, Priory Road, Hull, Yorkshire.

G3JSB, S. B. Jeffrey, 60 Albany Road, Norton, Stockton-on-Tees, Co. Durham.

G3JTT, W. R. Thompson, 5 Gresham Road, Birmingham, 28.

CHANGE OF ADDRESS

GW2BCH, J. P. O'Brien, Fron Heulog, Bryn Derw Road, nr. Llandudno Junction, Caerns.

G2FAF, J. Garbutt, 21 New Village Road, Cottingham, Hull, Yorkshire.

GM2HCL, F. Walsh, Kilspindie, Main Street South, Thornton, Fife.

G2YS, J. W. Swinnerton, 29 Station Avenue, Filey, Yorkshire.

G3ARZ, C. L. Waywell, 29 Readshill, Clophill, Bedford, Beds.

G3BNI, D. L. K. Coppendale, 517 Mawney Road, Romford, Essex.

G3BRQ, K. B. Tackley, 14 Prince Charles Crescent, Farnborough, Hants.

G3CCN, W/O H. Goodwill, c/o 5 Shawe Road, Flixton, Manchester, Lancs.

G3COV, G. B. Woffinden, 14 Grove Road, Egremont, Cumberland.

G3CSE, C. W. Smith, 100 Seaton Road, Hessle, E. Yorkshire.

G3FBI, C. Dunkerley, 198 Ashley Road, Hale, Cheshire. *(Tel.: Altrincham 0288).*

G3FEV, J. Platt, 78 Cunningham Drive, Unsworthy, Bury, Lancs.

GI3FJX, J. Davidson, 3 Woodland Gardens, Moss Road, Lambeg, Co. Antrim.

G3FOE, A. Royle, 26 Rutland Road, Hazel Grove, Cheshire.

G3GIY, H. Gregory, 56 Woodland Road, Maple Cross, Rickmansworth, Herts.

G3HAL, R. A. Parrott, 28 Vicarage Lane, Winslow, Bletchley, Bucks.

G3HWR, H. W. Rees, Coombe Abbey, Binley, Coventry, Warks.

G3IDR, R. Dalton Raby, 64 Queen's Road, Richmond, Surrey.

G3IGW, M. G. Whitaker, Stile House, Shelf, nr. Halifax, Yorkshire.

G3IOF, P/O K. V. O'Rourke, No. 2 Officers' Mess, R.A.F. Station, Marham, Norfolk.

G3ION, G. A. Allcock, 91 St. James Road, Shirley, Southampton, Hants.

G3JKF, K. V. Franklin, 11 Green Lane, Hendon, London, N.W.4. *(Tel.: Hendon 0613).*

G3JKO, M. Dransfield, 39 Cliff End, Purley, Surrey.

G3JKO/A, M. Dransfield, 1 Cavendish Crescent South, The Park, Nottingham.

G4FN, C. T. Wakeman, 25 Wallace Road, Grays, Essex.

GW5SA, D. Price-Jones, Maesquarre, Llandilo, Carmarthenshire. *(Tel.: Llandilo 2316).*

G6XD, J. J. G. Taylor, 24 Lansdowne Road, Crownhill, Plymouth, Devon.

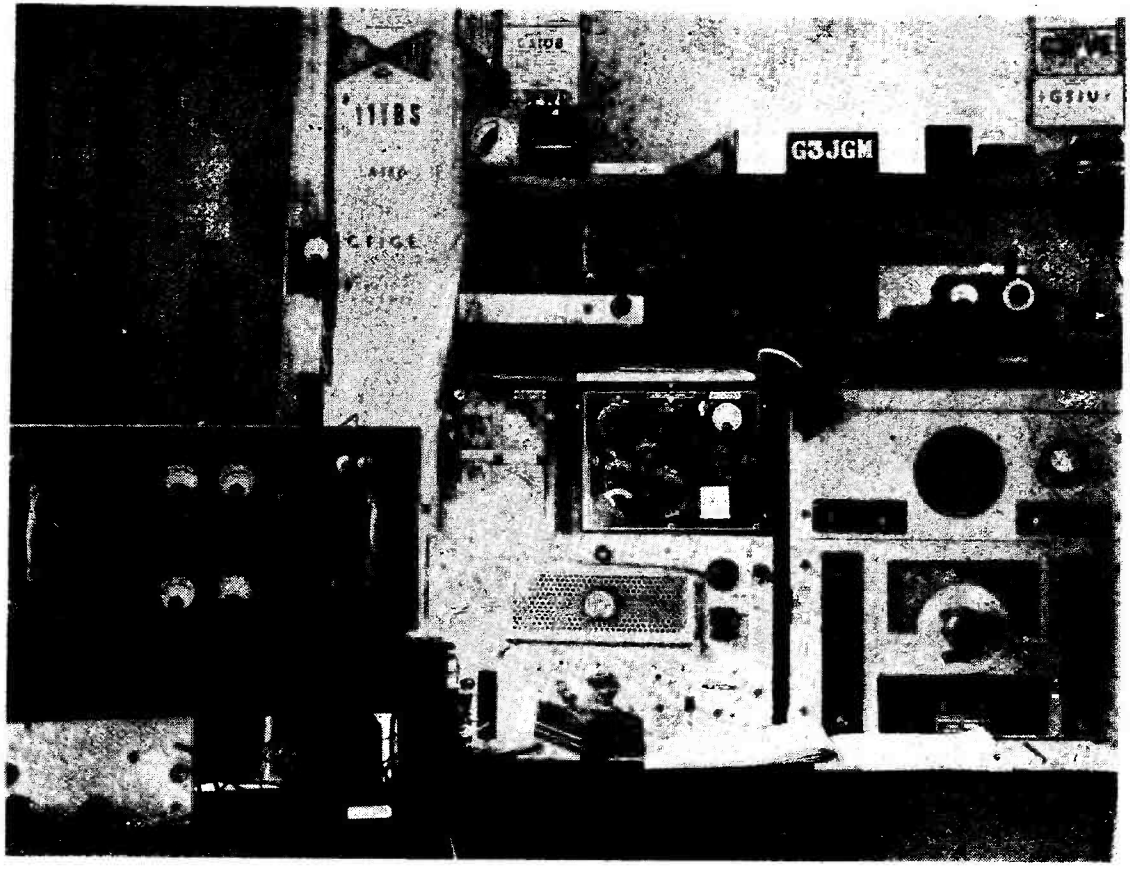
CORRECTION

G3ENX, D. M. Webber, 26 Torrington Place, North Hill, Plymouth, Devon.

GM3FRZ, G. B. Esslemont, 7 Hazledene Road, Aberdeen.

The Other Man's Station

G3JGM



FIRST licensed in September 1952, amateur station G3JGM is operated by J. G. Millington at 17 Tettenhall Road, Wolverhampton, Staffs. The 150-watt rig for 10-20-40 metre working is on the left, incorporating one, two or three keyed buffer-doublers to an 813, the bias for which is obtained from the small unit immediately below, while power supplies (a separate HT pack for each stage) are housed in the bottom section of the cabinet. Apart from general screening and a harmonic trap in the PA tank, no further precautions have yet been necessary against TVI, so operating hours in this area of high TV field strength are unrestricted. The Wilcox-Gay drive oscillator feeding into the big transmitter is standing on the main modulator, which delivers 75 watts of audio from a pair of zero-bias 807's for plate-and-screen amplitude modulation of the 813. The microphone in use is of the deaf-aid crystal type.

Next to the Wilcox-Gay is the 160-80 metre QRP transmitter, built in a CAY unit, running a 6F6 ECO to an 807 PA, ten to fifteen watts input. The QRP modulator is on the shelf immediately above, and consists of a 2-stage speech amplifier to a single KT66. The power pack next to it supplies either the Wilcox-Gay or the low-power transmitter. The receiver is a 19-valve Canadian VRL with external auto-transformer to run it at 110 volts, incorporating the frequency standard giving 1,000, 100 and 10 kc markers throughout the entire range, and modified by the substitution for the original dial of a slow-motion bandspread assembly from an R.1147. Auxiliary gear also visible in this photograph includes an absorption wavemeter and a grid dip oscillator with plug-in coils, while not shown are an R.1132A modified for two metres, and an R.1155F stand-by receiver, since removed to the /A station at Codsall Secondary School.

Aerials are the least satisfactory part of the installation, for the station is in a flat near the town centre and really efficient radiators are, unfortunately, out of the question. There is an 80 ft. Marconi and a 20-metre dipole, neither more than 20 feet high. A two-metre Yagi is in course of construction. Best results to date are 5-and-9 reports from several North African stations, and bands worked are 160 and 20, phone and CW, and 80 metres with QRP CW. Interests are not specialized, and anything with a radio angle appeals, particularly the conversion and modification of "surplus" gear. DX would be welcome but is not pined for, and a minor amusement has been collecting cards for the "Diplôme des Provinces de France" during short skip conditions on Twenty, which is not as easy as it sounds, because the F's only QSL about 40%. Working round the U.K. on 160 metres is also of interest at G3JGM. Plans for the future include a 2-metre transmitter and experiments with ground-plane aerials in the hope of achieving something in the way of DX on Twenty.

A 12-CHANNEL VHF TUNER

The Edison Swan Electric Co., Ltd., 155 Charing Cross Road, London, W.C.2, have recently introduced the new Ediswan-Clix television turret tuner, which is a 12-position pre-tuned RF and mixer stage for multi-channel TV receivers intended to cover Band I (the present BBC TV range) and Band III (174-216 mc). The tuner consists of 24 coil segments built up on a turret which rotates inside a totally enclosed oblong screening box; studs on the coil segments make contact with a row of spring connections. A spring, working against the indented central locator plate of the rotating drum, indexes the drum accurately in any of the twelve positions, and re-setting is precise. The tuner is designed for 75- or 300-ohm coax, is provided with trimmers for compensation, and each coil can be resonated by means of a threaded brass core with the tuner wired into position in the receiver.

HUGO GERNSBACK

For many years Editor and Proprietor of *Radio-Electronics*, the well-known American monthly magazine, Hugo Gernsback is also an author of note and a writer of science fiction—not in his excellent *Radio-Electronics*, we would hasten to add! Mr. Gernsback has recently been honoured in America for his many years' service to the radio industry, with which he has been closely identified as author and publisher since the earliest days. In January this year he also had conferred upon him the dignity of Officer of the Oaken Crown by the Grand Duchess of Luxembourg. He is a Luxembourger by birth, having emigrated to the United States at an early age.

VHF BROADCASTING

The BBC's plans for the building up of a VHF sound broadcasting system, using FM, have recently been announced. Some 51 stations are proposed to give nation-wide coverage, all operating in Band II (87.5-100 mc). Apart from the bad interference and generally unsatisfactory reception now being experienced in many parts of the country on the BBC's long- and medium-wave services, there are obvious advantages from a defence point of view in having a VHF broadcasting system. It is anticipated that the BBC's constructional programme — which will only be extended to the full if VHF sound broadcasting is found to justify itself — will take about ten years to complete at a cost of £10 million. At present, the only BBC FM station in Band II is the experimental FM transmitter at Wrotham, Kent, on 91.4 mc. This station radiates the normal Home Service programme at irregular times, using horizontal polarisation. It is interesting to note that in Band II, Germany is now operating more than *one hundred* FM stations, distributed geographically on 42 different frequencies in this band. On occasions, some of them can be heard very strongly in this country on receivers like the S.27. or tunable "Wrotham converters" covering Band II.

NOTE FOR CLUB SECRETARIES

The attention of all Club secretaries is drawn to the new layout and changed style of our "Month with the Clubs" feature. This has been done to make it more useful in the Club world and more interesting to the general reader. It gives Club secretaries (and scribes) scope for something more than the usual rubber-stamp write-up. As one of the ways to maintain interest in a Club's affairs is the regular publication of notes on its activities, all Club secretaries are invited to make full use of the space offered in "Month with the Clubs." All we ask is that reports should reach us by the due date (*see* panel each month) addressed "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

PANADAPTOR BC-1032B

Information as to circuitry and coupling arrangements for the BC-1032B is requested by R. J. R. Fussey, G3BQE, 31 Oldborough Road, North Wembley, Middlesex. He is interested in operating it with an AR77 or AR88 receiver.

DL2 QSL BUREAU

The address for this bureau was given wrongly on p.756 of our February issue, due to G3IEC having moved after the item was written. The correct address is: G. E. Verrill, G3IEC, 64 Forton Road, Gosport, Hants. G3IEC works very hard on this self-imposed task, which involves much keeping of records and correspondence owing to the frequent moves of DL2 personnel.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for Next Issue: MAY 14)

HAPPY are those Clubs whose members react favourably to the Great Outdoors. A summer season's programme of portable outings, D-F Tests and Field Days will keep any Club going for nearly half the year — if the members are keen.

This phenomenon of keenness, however, is unpredictable and it certainly is not regional. Thus one particular Club goes all open-airy from June to September, year after year, while its next-door neighbour carries on with the usual programme in the usual headquarters, but with poor attendances.

The success of Field Days and other outdoor events depends, in the long run, on the presence or absence of a good, keen organiser; hence *one man* can almost be said to decide whether a Club remains active and happy all the year round. Such a man is most likely to be found among your membership — have you recognised him yet?

One of the ways in which interest can be stimulated and new members encouraged is by regular publication of Club doings. That even after all these years there are some secretaries (and their scribes) who do not know the form is shown by the following letter, received recently from the newly-appointed scribe for a well-known Club: "Having undertaken the job of Scribe to this Society, I shall be pleased to know if you will publish in the Magazine a short paragraph each month on its activities if I supply the material; also your dead-line date for accepting news." Well, in the first place, we are only too pleased to give any Club a showing in this feature (which is what it is for) and to print all the Club news we can get; secondly, the dead-line date (which necessarily changes for each issue) is given unfailingly in this space every month!

By the same token, readers will find that the honorary secretaries of all Clubs reported in these pages will always be glad to hear from them, either as prospective members or simply as visitors to Club meetings. For the convenience of all concerned, the address of the secretary of every Club reported in any issue is given in a separate panel each month; in the nature of things, all Clubs do not report every month, so it may be a matter of looking through the Secretaries' Address Panel in several issues to find your local secretary's address.

Amateur Television

The ***British Amateur Television Club*** now has 300 members concerned, in one way or another, with Amateur TV transmission. G2WJ's pictures on 436 mc should be easily received by almost anyone in the London area. The BATC met on April 28 at Chelmsford, for a lecture and demonstration on Image Orthicon cameras. Unfortunately the notice of this meeting was not received in time for last month's issue — but we hope it was successful.

On May 11 ***Romford*** will hold a meeting in conjunction with the BATC, with a lecture-demonstration on a live TV camera by G3AKJ. Romford's other activities include a Junk Sale (May 4), talk on Workshop practice (May 18), discussion on NFD (May 25). The Club Tx, G4KF, is on the air from the Headquarters at R.A.F.A. House, 18 Carlton Road, Romford, where meetings are held every Tuesday at 8.15 p.m.

Visit to Rugby

Members of the ***Leicester Radio Society*** had an unusually interesting day out on Sunday, March 28, which was spent looking over the equipment of the GPO station at Rugby. A "capacity house" assembled to hear G2BVW give his lecture on "Getting Going on VHF," at which he demonstrated his receiver, adaptable for both 144 and 430 mc, as described in our recent issues. Signals from G2FNW (Melton Mowbray) were received on both bands, despite a very poor aerial system. Leicester have arranged a full programme of lectures and visits for the summer, and will meet on May 10 and 24 to discuss and make plans for NFD activities.

Portsmouth have acquired the new Clubroom they were hoping for, and take over their permanent home on May 1. It is located in two rooms of the British Legion Club, Queen's Crescent, Southsea. Until members have completed the re-decoration, however, meetings will continue in the Signal Club Room, Royal Marine Barracks, Eastney, on Tuesdays at 7.30 p.m. The new premises will be available every day until 10 or 10.30 p.m., and it is hoped that the facilities provided will attract more members.

On April 17 ***Torbay*** held their AGM, with G2GK in the chair; he commented upon a very successful year and the sound state of the Society's affairs. All officers were re-elected, old timer G5SY continuing as president; he has had no less than 44 years of Amateur Radio, and (many years ago) was the first G ever to be heard in New Zealand on the then unexplored ten-metre band. A TVI committee is proposed and the matter will be discussed at the next meeting on May 15. It is also

Taken at a recent dinner of the Reading Radio Society, of which the new president is G2FZI. Their annual general meeting was held on March 27 last, when G2BHS was again elected to the office of secretary, which he has held for several years.

of interest to add that ZC4LW, now on 14020 kc CW from Cyprus, is the son of G3GDW, Torbay's honorary secretary.

The ***Reading*** Radio Society's AGM took place on March 27, when officers were elected for the coming year, with G2FZI as president and G2BHS continuing as honorary secretary. This is another old-established Club, with a long record of useful activity.

New Organisation

The ***Radio Amateur Invalid and Bedfast Club*** is now a separate and self-contained organisation, the object of which is to help " bedfast " amateurs in every possible way — with gear, components, books or magazines. The Hon. Secretary (*see* panel) would be glad to hear from amateurs willing to be enrolled as visiting representatives ; the treasurer (E15L) would be grateful for donations ; and any unwanted books or magazines should be sent to John Gill, 30 Sholebroke View, Leeds 7.

There is a Hamfest at ***Southend*** on May 8, from 7.30 p.m. ; this will be held in the ballroom of the London Hotel, and tickets are available at 3s. 6d. A recent event at the Club was the judging of home constructors' entries for the Pocock and Hudson cups. The former cup, in the senior class, was won by Mr. H. Wilkinson with his FM-AM Receiver, and the latter, in the junior class, by Mr. D. Whitworth with his Valve Voltmeter. The actual awards will be made at the Hamfest in May. On May 14, the lecture will be on the Ferranti Electronic Computer and on May 28 the Use of Radio by the Fire Brigade.

For the Beginner

A sound idea comes from ***South Manchester;*** each week the main lecture will be preceded by a short talk of a very simple nature, for the benefit of those just taking up radio as a hobby. Any such beginners are cordially invited to go along to future meetings.

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

BRIGHTON : T. J. Huggett, 15 Waverley Crescent, Brighton 6.
BRITISH AMATEUR TELEVISION CLUB : M. Barlow, G3CVO, Cheyne Cottage, Dukes Wood Drive, Gerrards Cross.
CLIFTON : C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
COVENTRY : K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
EAST SURREY : L. Knight, G5LK, Radiohme, Madeira Walk, Reigate.
GRAFTON : A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
HASTINGS : W. E. Thompson, 8 Coventry Road, St. Leonards-on-Sea.
LEICESTER : W. N. Wibberley, 21 Pauline Avenue, Belgrave, Leicester.
LINCOLN : S. Harrison, 4 Prefab, Main Avenue, Bracebridge Heath, Lincoln.
PORTSMOUTH : L. Rooms, G8BU, 51 Locksway Road, Milton, Portsmouth.
QRP SOCIETY : J. Whitehead, 92 Ryden's Avenue, Walton-on-Thames, Surrey.
RADIO AMATEUR INVALID & BEDFAST CLUB : W. Harris, 25 Playford Lane, Rushmere, Ipswich.
READING : L. A. Hensford, G2BHS, 30 Boston Avenue, Reading.
ROMFORD : N. Miller, 10 Rom Crescent, Romford.
SOLIHULL : G. A. Swinnerton, G6AS, 120 Grange Road, Olton, Birmingham 27.
SOUTHEND : J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SOUTH MANCHESTER : M. Barnsley, G3HZM, 17 Cross Street, Bradford, Manchester 11.
SPEN VALLEY : N. Pride, 100 Raikes Lane, Birstall, nr. Leeds.
TORBAY : L. H. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot, S. Devon.
WARRINGTON : G. H. Flood, 32 Capesthorne Road, Orford, Warrington.

A different approach is made by ***Brighton,*** where the Club has acquired a large quantity of components, and is starting an "assisted constructional scheme" to help younger members build equipment of their own. Last month's Junk Sale was so successful that a repeat performance is being organised, and Mr. E. Bannister's series of talks on Radio Mathematics is proving to be of great help to newcomers.

Non-Radio Lectures

We have noticed that many Clubs have been featuring lectures on subjects other than radio — and why not? When a Club can avail itself of the services of a lecturer (and it already has the advantages of a meeting place and a gathering of intelligent listeners) it is a great pity to keep the subjects slavishly confined to radio.

Hastings, for instance, recently had a very interesting lecture on The Theory of Flight — from the most primitive aircraft up to the modern jet. ***Clifton*** describe as "one of their best evenings" the night when Mr. D. S. Mahon, B.Sc., of Bakelite, Ltd., talked to them on Plastics, illustrating his talk with two films.

Recent activities at ***Coventry*** have included talks on "An Introduction to Amateur Radio," contributed by a number of members, including G5GR and G2FTK; a lecture by G3RF on Tuned Circuits; and a popular "Club Night on the Air," when nine members took part from their own stations.

East Surrey has been breaking attendance records, and the speaker at a recent meeting was G4ZU, covering the subject of Crystal Diodes and Transistors. Interesting constructional work is in hand for the Club station. ***Grafton*** also continues to flourish, and has heard talks on Superhets (H. Hill) and Antenna Design (G2AAN), as well as holding a junk sale. At present all preparations are being made for the NFD station, which will operate from Tumulus Hill, Hampstead Heath.

Tangier R.A.C.

An interesting letter from CN2AP (ex-G2CIW) states that the committee of the Club has been reorganised and now has as members representatives of the various nationalities in Tangier. CN2AO is president and CN2AR vice-president. The Club is officially recognised by the Tangier Administration, which is drafting a new law to cover Amateur Radio operation; the EK1 prefix is now obsolete and callsigns are being issued in the sequence CN2AA-CN2BE. The newly-appointed QSL manager is CN2AP (French P.O. Box 150, Tangier) and he will also deal with all correspondence with English-speaking organisations.

Specialists

The ***QRP Society*** is organising a campaign to encourage the use of low power by all stations participating in local nets. Obviously there is no point in using 150 watts for a job that could, and should, be done with 5 watts. Special arrangements are being made for a gathering of the QRP membership, to coincide with this year's Amateur Radio Exhibition. The QRP Society wishes to contact all Clubs interested in such work, with a view to organising special contests and trials. Further information from the Hon. Secretary — see panel.

Broadsheets

We are not receiving as many Club publications, Newsletters and Broadsheets as we used to, and we would like to bring it to the notice of Club secretaries that we are always interested in such efforts. The journal of the ***QRP Society*** has now reached Issue No. 54, and is always full of interest. Another "regular" comes from South Africa; the bulletin of the ***South Coast Radio Club*** is called "South Coast QRM," and the latest issue covers subjects from Alignment of Radio Receivers to Air-Lift Pumps for Tropical Fish! (There is also a page on "How to Open Locks without Keys or Picks.") A new arrival this month is a 16-page publication from the ***Southgate and District Group.*** This is informative and full of interest, too.

Other News in Brief

BRIGHTON: Meetings every Tuesday, 7.30 p.m., at the Eagle Inn, Gloucester Road. Club Tx on the air. Phone and CW, 80 and 160.

CLIFTON: Every Friday, 7.30 p.m., at the Clubroom, 225 New Cross Road, London, S.E.14.

COVENTRY: Alternate Mondays. Next meeting on May 10 (Valve Voltmeters) and May 24 (Five-minute lecturettes by members). All at 9 Queen's Road, Coventry, at 7.30 p.m.

HARROW: May 7, Junk Sale; May 14 and 28, Practical; May 21, Listening for DX; June 7, NFD Discussion.

LINCOLN: Meetings on the first Wednesday in every month, at the Technical College, Lincoln.

SOLIHULL: Meetings at the Old Manor House, High Street, Solihull, on May 14 and 28, and fortnightly thereafter.

SOUTH MANCHESTER: May 21, Demonstration of Portable (G2AMV); June 4, Clamp Tube Modulation (G6DN); June 18, Transistors (W. L. Robinson).

SPEN VALLEY: May 19, Two Metres (G2FCL); June 2, Junk Sale: June 16, Visit to Thornhill Power Station, B.E.A.

WARRINGTON: May 18, Business and "Any Questions?"; June 1, Demonstration of Club Field Day Equipment. Meetings held in the Clubroom at the King's Head Hotel, Winwick Street, at 7.30 p.m.

Deadline for next month's reports is:
First post on Friday, May 14,
addressed "Club Secretary,"
Short Wave Magazine,
55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS

9d. per word. minimum charge 12/-. No series discount ; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted or errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

OFFICIAL APPOINTMENTS

FORCES BROADCASTING SERVICE (War Department employment): Applications are invited by the War Office for men (British only) for Junior Technical appointments in the Middle East for a minimum period of 3 years : salary scale £330-£505 per annum, plus Foreign Service Allowance (free of Income Tax) to cover the extra cost of living at overseas stations. Starting salary according to age and experience ; outfit allowance. Candidates should have had a good general education and possess a sound knowledge of transmitters and aerials ; C. and G. Certificates an advantage.—Application forms and further details can be obtained ON WRITTEN APPLICATION ONLY from War Office (A.G.3.Ent), London, S.W.1. Closing date 28th May, 1954.

TRADE

QSL CARDS AND LOG BOOKS. APPROVED G.P.O. SAMPLES FREE. — ATKINSON BROS., PRINTERS, ELLAND, YORKS.

WANTED: ALTHAM RADIO CO. pay highest prices in the trade for all American equipment, including test sets, transmitters, receivers, etc.—Jersey House, Jersey Street, Manchester, 4. *(Tel.: Central 7834-5-6).*

VALVES: Types 813, 832 and 723 A/B, wanted urgently ; high prices paid. — Write: Pype-Hayes Radio, 606 Kingsbury Road, Birmingham 24 *(Erdington 4942).*

WANTED: BC610 Hallicrafters, ET4336 Transmitters, AR88's, receivers and spare parts for above. Best prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

WANTED: RCA Speech Amplifiers, Type M1-11220 J or K, and aerial tuning units BC939a.—Offers, stating quantity and price, to P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

WANTED: TUNING UNITS TN17, TN18, TN19 for R54/APR4 ; £50 each offered.—Box No. 1383, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

QSL's and LOGS by MINERVA. The best there are.—Samples from Minerva Press, 48 Queen's Road, Brentwood, Essex.

45/- PAID for new boxed 813's. Other surplus valves purchased. — Details to Box 1406, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVES (over 3,000 in stock): 2D21, EC91, 12AU7, 6BR7, 6CH6, 6BW6, 6SN7, 9/- ; EL91, 6F33, 12AT7, EY91, 7/- ; EF91, 6J6, 12AX7, 6/6 ; 6AL5, 6C4, EAC91, EF92, 5/6 ; 6AK5, 7/6.—Skillman, Franchise Street, Weymouth.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

WANTED for cash, AR88 Receiver, condition immaterial, reasonable price; also Panda Transmitter, 813 valves, U.S.A. test gear. Bargains in valves: 6SN7, 6AG7, 807, 6/-; 6Q7, 6V6G, X65, 5Z4, 5/6; KTW61, KTW62, 6N7G, 3/6. Lang and medium wave HRO coils from 20/-. Many other items in mains transformers, condensers, chokes, all sizes. Send your requirements. Exchanges considered.—Box No. 1399, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

S. 640, very late model, unmodified; excellent condition and fine performance, manual; £18.—J. Fairs, 2a Durham Road, Redcar, Yorks.

EDDYSTONE 640 and Speaker, good condition, £18. Valves: 832's (2), 25/- each; EL32's, 4/- each. New, but unboxed.—Box No. 1397, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BC348L, converted AC/DC, with loudspeaker and phones; excellent working order. Offers invited.—Box No. 1398, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TCS12 Rx/PP. Offers? WANTED: Wavemeter, Class-D AC, BC221, 100 kc xtal; 6D6's, 42's.—G3KX, 3 Springvale, Locking Road East, Weston-super-Mare.

WANTED: Buy or borrow Instruction Book and/or Circuit Diagram of Q-Max Q5/10X receiver. Any help appreciated.—G2BSA, Lamana, Hannafore, Looe, Cornwall.

FOR SALE: G.E.C. BRT400B Receiver. £90.—Box 1400, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Q-MAX B4/40 Transmitter, 40-watt, 3.5 to 30 mc bandswitched, Phone/CW, table topper, good condition; cost £75; offers over £35.—Box No. 1401, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO Power Pack and Coils for sale, £25. WANTED: Jenson Electro-Dynamic Speaker. Model A.12.—Saracen's Head, *Daventry 351*.

G3CZY, aged 24, single, requires accommodation in West London area where no objection will be raised to the installation of his rig.—Please write: P. B. West, Radar Unit, London Airport.

COMPLETE First-class Transmitter, Type 8C modified, Phone and CW on 20, 10 and 2 metres. Remote control. All stages metered. Only £35 if buyer collects. QTH Glasgow.—Box No. 1402, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Eddystone 640, perfect; QRO band-switched Tx, Phone/CW, in ET4336 cabinet; pair 813's, new; transformer 1250-1250, 250 mA; £45 the lot. Buyer collects.—436, Woolwich Road, Charlton, S.E.7.

144 mc SCR522 Tx/Rx with 12v. Dynamotor, Genbook, valves,, xtal, cables, controller; Rx RF circuits removed; £10 or offer.—*EWELL 3699*.

6AG5, 6V6, 807, EF91, UCH42, EL41, ECT, 6/- each. S.A.E. list others.—Blackwell, 25 Barons Way, Thorpe Lea, Egham, Surrey.

SMALL ADVERTISEMENTS, READERS—*continued*

Q-MAX. Q5/10X, Double Superhet, amateur bands only; fine Rx, used one month, perfect; sell £55, or exchange Tape Recorder.—GW3HXX. 135 Military Road, Pembroke Dock, Pembs.

HRO with p/pack, 5 coils, 4 bandspread; new valves; £30. Q5'er, controls on front, as new. £3.—G3DO, 31 Ladywood Road, Sutton Coldfield. Warwickshire.

SALE: Hammarlund HQ120X, reasonable condition; six bands, 550 kc-31 mc; calibrated bandspread, crystal filter, audio filter added; slightly modified, with speaker, handbook; £25. Stromberg-Carlsen Trigger Oscilloscope, RWM81-C, 5in. tube. 230v. AC input, 15 valves, circuit, £7 10s. 0d. Two-metre gear; BC625 Tx modified *QST*, modulator and meter, less one 832, £3. BC624C Rx, modified to double superhet; tuneable 20 mc IF; requires finishing; 12 valves; £2. BC625 Tx, less mod. trans., valves, £1. Rack mounting PA unit, P/P 811's, grid and plate meters, coils 20 and 40 mtrs., with 811's, £4 10s. 0d. (less valves £1 15s. 0d.). D104 xtal microphone, £3. Transformers, 1500-1250-1000-0-1000-1250-1500 volts, 325 mA, 6.3v. 1A, £2. 450-300-0-300-450 volts, 150 mA, 4v4A twice, £1 10s. 0d. Woden 2-0-2v, 6A, £1. Output trans. for p/p 6V6, 15/-. Haynes Radio line output trans and scanning coils for *Electronics* T/V, pair £2. LF chokes, 12H, 250 mA, Parmeko, £1. Swinging 4/20H., 250 mA, Parmeko, 15/-. Condensers, 4 μF, 1500v., 5/- each. Valves, meters, etc., available. Specific enquiries welcomed. No lists. Add post and packing.—G3AUT, 257 Bilton Road, Rugby, Warwickshire.

DST.100 Mk. III with manual, power pack; perfect; £28. 50 kc to 30 mc, also complete station. S.A.E. list. — G3GCO, 31 The Crescent, Donnington, Salop.

AR88D, beautiful condition, with manual, £60. Prefer buyer inspects. Manchester area. Good HRO wanted, table type.—Box No. 1405, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

GENUINE Bargain: Eddystone 740, few months old, absolutely new and perfect; first £28 or nearest offer. Must be sold. (New price, £42 15s.).—Box 1404, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: BC348, fitted with power pack, S-meter, etc.; good order. Set brand-new valves for 1196. Best offers secure.—Box No. 1403, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR77 INSTRUCTIONS, £1; EF37A (4), 25/-; ECC35 (4), 25/-; 6V6GT (6), £2; 5Z4M (8), 65/-.—Box No. 1408, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TEN-VALVE Midwest all-wave superhet chassis. £9.—13 Alder Road, Glasgow.

WANTED: *QST*, 1915 to 1923; *Radio*, June 1933 to December 1935; *R/9*, September 1932 to March 1935; *CQ*, January, March, April, June, November, December 1945, May 1946. Also many *Amateur Radio*, *Break-In*, *Xtal*, *QTC*, and any other overseas amateur magazines in English. Air-mail offers, all expenses refunded.—G3IDG, 95 Ramsden Road, London, S.W.12.

SMALL ADVERTISEMENTS, READERS—*continued*

SEVERAL Post-War Communication Receivers, mint condition, sell or exchange one for CR/100. Callers only.—Fawkes, St. Chloe Green, Amberley, Stroud, Glos.

FOR SALE: Avometer Model 40, excellent condition, £7 o.n.o.—Box No. 1407, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OIL-FILLED Variac Transformer, 200-250v. 50 cycle input, 220v. 7.5 amps. out. Best offer over £5 secures.—Box No. 1409, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: AR88D in first-class condition. Will pay good cash price. FOR SALE: New 813's, TZ40's, Labgear 2-gang with PA coils, Woden mod. transformers, 2000-0-2000 mains transformers, chokes, etc. Also Junior HRO in mint condition.—Apply GD61A, Ballasalla Place, Ballasalla, Isle of Man.

UNUSED 5-waveband Denco CT7 Coil Turret; tuning drive, dial, 3-gang condenser, chassis, 2 IF transformers; £8. *Modern Electric Wiring* (Cowley), unused, £1. *Modern Practical Radio and Television* (Quarrington), 4 volumes, unused, £2 10s. 4v. 2-amp. Filament Transformer, 6/-; 4 x 6C5's, 1 each ATP, 7D3, V30, 5/- each; 2 x PX4 and massive P/P O/P Trans., 35/-; 5" Energised Speaker, 7/6.—Wood, 118 Moscow Drive, Liverpool 13.

EXCHANGE: Part-built *E.E.* Televisor, all valves, tube, parts, except mains xformer, for Communication Rx.—6 Handforth Grove, Manchester 13.

FOR SALE: S.640 with S-meter, mint, £19 10s. 0d. AR88D, £55. Buyers collect. Offers for FL8 Filter?—Reynolds, 149 Waller Road, London, S.E.14. (*New Cross 1443*).

FOR SALE: BC221N (stabilised P/Pack), £28. Meisnner Signal Shifter De Luxe, £20. Hallicrafters S.40 (with autotrans.), £28. 150w. Tank unit (Q-Max), £4 10s. UM3, £3. Two 100 $\mu\mu$F Cyldon Tx Condensers, 10/- each. Webley Senior air pistol (.22), £6 10s. 0d.—Box 1412, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE, American Sig. Gen., 100 kc to 120 mc, £20 or best offer. 150 Valves, 2 sets SCR522 spares and other components. Will sell in lots from £5 up. — Box 1411, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: S-Meter and R.107 Output Transformer; also 10" 15-ohm speaker; all reasonable.—Albans, 17 Fern Road, Cropwell-Bishop, Notts.

R 208 Rx, 10-60 mc, built-in AC Power Pack 100-250v., and 6v. vibrator supply, built-in speaker, very good condition; excellent performance on all bands, including TV; £8 10s. R107 Rx, 1.2 to 18 mc, built-in speaker, 100v.-250v. AC, on 12v. Batt; brand-new condition, unmodified; £12. BC348 200-500 kc and 1:5 mc-18 mc, fully modified with built-in power pack; good performance; nice condition; £18. HRO Senior table-top Rx and power pack, 1.7 mc to 30 mc; condition and performance good; £29.—N. T. Lowe, 6a Middle Brook Street, Winchester.

FOR SALE: Eddystone 640, practically new; stored in maker's carton; matching speaker. Offers.—Box 1410, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

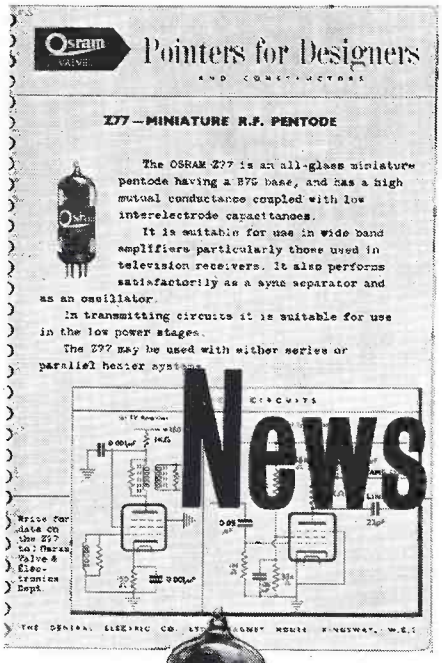
SELLING UP: BC348R, Q5'er; power packs. Class-D wavemeter, Taylor 85P, as new; 1154. new; 154 VFO, PA, with pair PT15's, TU5B; 1196. new, valves unused—100TH, 35T's. Many Rx types, all unused. Reasonable offer for any accepted. S.A.E. list.—G3VV, 331 Audley Range, Blackburn, Lancs.

SALE: AR77E (good Rx), £30 nearest. RCA TE149 wavemeter, offers? TA-12C Tx, mostly original; offers?—Box 1413, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R. 1224A WANTED; must be good condition: prefer unmodified; if modified, give circuit. Disposer delivers. — Full details to: Jones, Constables, Uppingham, Rutland.

WANTED: Army Trans-receiver, Type 22, complete and perfect (not modified). Also AR88 receiver. FOR SALE: Four 35T valves; offers?—82 Framingham Road, Sale, Cheshire.

150 W. Tx. 813 PA. TZ40 modulators ATU, VFO. Complete with power packs; for 80, 40, 20, 10 meters; £25 o.n.o. Buyers collect. All correspondence answered. — Wormald, 23 Coda Avenue, Bishopthorpe, Yorks.



Osram VALVES

News for Tx-men!

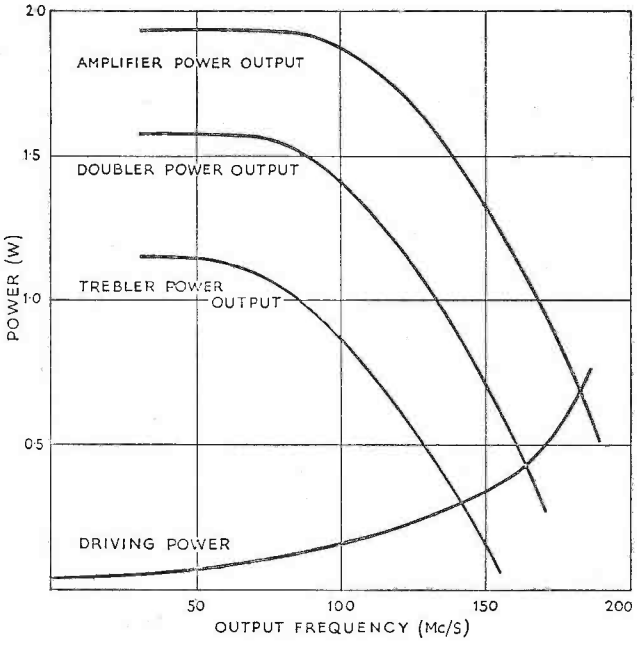
Z77 High slope R.F. pentode Miniature all glass type

Well known as an R.F. amplifier in radio and television receivers, the Osram Z77 can be used with success as a power amplifier or frequency multiplier in the early stages of radio transmitters. The heater is rated at 6.3V, 0.3A and the valve combines the high slope of 7.5mA/V with low inter-electrode capacitances. In the curves shown below the driving power figures apply to all three conditions.

TYPICAL OPERATION

	Amplifier f_{out} 120Mc/s	Doubler f_{out} 120Mc/s	Trebler f_{out} 120Mc/s	
V_a	300	300	300	V
V_{g2}	250	200	200	V
V_{g1}	−20	−20	−20	V
I_a	11.3	10	10	mA
I_{g2}	3.2	3.2	3.2	mA
I_{g1}	1.0	1.0	1.0	mA
P_{out}	1.7	1.2	0.6	W

Write for data on the Z77 to the Osram Valve & Electronics Dept :



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OZ4A ... 7/–	6K7G ... 6/6	14A7 ... 8/6	EF50 (Red. Syl.) ... 10/–	CV54 ... 5/–
1G6 ... 6/6	6K7M ... 7/6	25Z6GT 8/6	EF50 (Ex-Units) 5/–	S130 ... 7/6
1R5 ... 8/–	6K8G ... 9/–	25Z5 ... 8/6	SP2 ... 8/6	7475 ... 7/6
1S4 ... 8/–	6K8GT ... 9/–	35Z4GT 8/6	VP2 ... 8/6	CV66 ... 6/–
1S5 ... 8/–	6L6G ... 8/6	25A6 ... 8/6	TDD2A 8/6	VR150/30 8/6
1T4 ... 8/–	6L7 ... 7/6	35L6 ... 8/6	DK40 ... 9/–	CK510AX 5/–
1A7GT ... 10/–	6N7GT ... 7/6	50L6GT 8/6	UL41 ... 9/–	DI ... 2/–
1C5 ... 8/–	6Q7GT ... 8/6	42 ... 8/6	UY41 ... 9/–	AC6PEN ... 6/6
1LN5 ... 8/–	6SJ7GT 8/6	43 ... 8/6	4D1 ... 4/–	AC5/PENDD 12/6
2X2 ... 5/–	6R7 ... 8/6	75 ... 8/6	8D2 ... 4/–	PEN25 ... 6/6
3V4 ... 8/–	6X5G ... 8/6	78 ... 8/6	9D2 ... 4/–	TP25 ... 8/–
3S4 ... 8/–	6SA7GT 8/6	80 ... 8/6	15D2 ... 10/–	PEN46 ... 7/6
5Z3 ... 8/6	6SQ7GT 8/6	866A ... 15/–	R3 ... 8/6	QP25 ... 6/6
5U4 ... 8/–	6SG7 ... 7/6	9001 ... 6/–	D41 ... 5/–	SP61 ... 4/–
5Z4 ... 8/6	6SH7M ... 7/6	9002 ... 6/–	D42 ... 5/–	SP41 ... 4/–
6A7G ... 8/6	6SK7GT 7/6	9003 ... 6/–	D63 ... 5/–	HL23/DD 6/6
6AC7 ... 6/6	6SL7GT 9/–	9004 ... 6/–	KT2 ... 5/–	VP23 ... 6/6
6AG5 ... 7/6	6SN7GT 9/–	9006 ... 6/–	KTW63 7/6	VP41 ... 7/6
6A8G ... 8/6	6SC7 ... 10/–	954 ... 6/–	U19 ... 10/–	U22 ... 8/6
6AM6 ... 9/–	6SS7 ... 7/6	955 ... 6/–	Y63 ... 8/6	AT24 ... 4/–
6B8 ... 7/6	6V6GT 7/6	956 ... 6/–	P2 ... 4/–	TP22 ... 8/6
6C4 ... 8/6	7C5 ... 8/6	1299A ... 7/6	MU14 ... 8/6	TH233 ... 10/–
6C5GT ... 5/–	7S7 ... 10/–	TZ40 ... 37/6	PX25 ... 12/6	41MP ... 7/6
6C6 ... 6/6	12A6 ... 7/6	931A ... 50/–	KT33C 10/–	42SPT ... 6/–
6D6 ... 6/6	12C8 ... 7/6	EA50 ... 2/–	KT66 ... 12/6	215SG ... 4/–
6F6G ... 8/6	12H6 ... 8/6	EF54 (VR136) 6/–	GU50 ... 12/6	M5/PENB 7/6
6G6G ... 6/6	12K7GT 8/6	EB34 ... 3/6	XP(2v.) ... 4/–	6U5 ... 7/6
6H6GT ... 5/–	12K8GT 8/6	EBC33 ... 8/6	XH(1.5) ... 4/–	6U5G ... 7/6
6H6M ... 8/6	12Q7GT 8/6	EF36 ... 6/6	VU111 ... 4/–	FC13C ... 10/–
6J5GT ... 5/–	12SA7GT 8/6	EF39 ... 6/6	VU133 ... 4/–	ID5 ... 8/6
6J5M ... 8/6	12SQ7GT 8/6	EK32 ... 6/6	VU120A 4/–	PENDD4020 12/6
6J6 ... 9/–	12SG7 ... 7/6	EF91 ... 9/–	AC/PEN(7) 10/–
6AK5 ... 9/–	12SH7 ... 7/6	EL32 ... 7/6	VP4 (7) ... 8/6
6J7G ... 6/6	12SJ7 ... 8/6	EL33 ... 10/–
6J7M ... 8/6	12SK7 ... 8/6
6K6 ... 9/–	12SR7 ... 7/6

INDICATOR UNIT TYPE SLC5

This unit is ideal for conversion for a 'Scope Unit or basis for Midget Television. It contains C/R Tube type ACR10 (VCR193A) complete with holder and cradle, also earthing clip, 1-VR66, 2-VR65, 24 mfd. 550v. wkg. condenser, potentiometers and a varied assortment of resistors and condensers. These units are in good condition and packed in wooden transit cases. The C/R Tube will be tested before despatch. Dimensions : 8½in. x 6½in. x 11½in. **45/–.**

WANTED

723 A/B 931A, 9003, 813. Top Prices Paid.

62A INDICATOR UNIT

Complete with VCR97 or 517C, 12—EF50, 4—SP61, 3—EA50, 2—EB34.
Built on double-deck chassis. Absolute new condition. **99/6,** Carr. 7/6. Or less Tube, **69/6.** Carr. 7/6.

PYE 45 MC/S. STRIP, TYPE 3583 UNITS

Size 15in. x 8in. x 2in. Complete with 45 Mc/s. Pye Strip, 12 valves, 10 EF50, EB34 and EA50, volume controls and hosts of Resistors and Condensers. Sound and vision can be incorporated on this chassis with minimum space. New condition. Modification data supplied. Price **£5.** Carriage paid.

No. 38 "WALKIE-TALKIE" TRANSRECEIVER

Complete with Throat Mike, 'Phones, Junction Box and aerial rods in canvas bag. Freq. range 7.4 to 9 Mc/s. All units are as new and tested before despatch. As supplied to Overseas Police Forces. **£4/10/0.**

R.F. UNITS (Brand New)

Type 24. Switched Tuning 20-30 Mc/s with valves, etc. **15/–,** post paid.
Type 25. Switched Tuning 40-50 Mc/s with valves, etc. **19/6,** post paid.
Type 27. Variable Tuning 65-85 Mc/s with valves, etc. **45/–,** post paid.
Type 26. Variable Tuning 50-65 Mc/s wish valves, etc. **45/–,** post paid.

G2AK THIS MONTH'S BARGAINS G2AK

NOISE LIMITERS. Plug-in type, no re-wiring required. 3 positions. Brand new in cartons. **15/–** each. Post and packing **1/-.**

METERS. 0-9A Hot Wire, 2" Flush 0-4A Thermo, 20/0/20 amps, **5/–.** 0-350 mA Thermo, 0-2A Thermo, **7/6,** 0-100, mA and 0-10 mA 2½" Flush, **12/6** each. 0-5 mA square 2", Flush, **10/–,** 0-1 mA, 2" square, **20/–.** 2" square 0-10A D.C., **7/6.** 0-50 mA, **7/6** each.

RACK MOUNTING PANELS. Black crackle finish, 19" x 5¼", 7", 8¾" or 10½" at **5/9, 6/6, 7/6, 9/–** respectively. Postage and packing 1/6.

COPPER WIRE. 14G. H/D. 140 feet **15/–,** 70ft. **7/6.** Post and Packing 2/-. Other lengths pro-rata.

TWIN FEEDER. Special offer, 300 ohm flat twin, 150 watt rating. (Minimum 20 yards), **6d.** yard, post free. Similar K25.

V.H.F. FANS. THE BUY OF THE YEAR. Air spaced 150 ohm. Coaxial Cable, 20 yard coils, **£1** each (Normal price 3/11 per ft.). VERY LIMITED QUANTITY.

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HEADPHONES. Low resistance type CLR No.3 **9/6,** DLR No.2 **13/6,** high resistance CHR Mark 2 **17/6** and the most sensitive of all DHR No.5B **18/6** per pair. P. and P. 1/- per pair.

THIS MONTH'S SPECIAL :—
MULTI METER, BASIC UNIT. 400 micro amp F.S.D. Scaled, 8 ranges AC/DC volts, HI and LO ohms, complete with rectifier. Made by Triplett U.S.A. *Size :* 5⅝" x 2⅞",
ONLY 32/6 post free.

HIGH NOTE BUZZERS for practice, **5/–.** Straight Keys, brand new, all metal, crackle finish, **5/–.** Small round Buzzers, **2/–.**

SPECIAL TRANSFORMER OFFER. Pri. 115, 210, 240v. Sec. 260/260v. 100 mA, 6.3v. 3A., 6.3v. 1A. (for 6 x 5 rectifier). Universal mounting. Limited quantity, **17/6** each. Post free.

SHADED POLE MOTORS. For Tape Recorders or Gram. Units, with voltage tapping plate 200/250 volts. 3-hole fixing. Our price **12/6** each or **21/–** pair. Post and packing on either, 1/6.

AR88 SPARES. Cabinets complete with side channels and base, **£4/15/–,** p. & p. 7/6. Complete valve kit (14), **£5/10/–.** RCA matching speaker, **£3/5/–.** Panel escutchions, **22/6.** "D" I.F.S., **12/6.** Spare coils for some ranges only, **7/6** each. Output transformers to Government specification, **37/6.**

VIBRATOR POWER UNITS. 6v. input, 220v. 60mA output. Fully smoothed and filtered, **30/–,** post free.

R.F. CHOKES. Pie wound. 1.25 mH., 100 mA., receiver type, **9d.** each, or **7/6** per dozen ; 250 mA., transmitter type, **1/–** each, **10/–** per dozen.

SPECIAL VALVE OFFER. Kit of 4 midget 1.4v. valves, 1 each 1S5, 1R5, 1T4 and 1S4, **30/–** or **8/6** each, separately. Most other 1.4v. types also available at **8/6.**

SPECIAL VALVE OFFER. 8012, **12/6** each. 6L6G, **10/6,** 813, **70/–,** 829, **80/–,** 866a, **17/6** each or **30/–** a pair. 807 **10/–** each or **17/6** a pair. 913A, **45/–.**

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