

Editor:

BERNARD E. JONES

Technical Editor:

J. H. REYNER,  
B.Sc. (Hons.), A.M.I.E.E.

# Wireless Magazine

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Research Consultant:

W. JAMES

Assistant Editor:

D. SISSON RELPH

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## The Editor's Chat

**D**ISCERNING READERS—I have never met an editor whose readers did not come within that category—will at once notice that our pages are set in larger and clearer type, and I may surprise them by saying that this has been done without any sacrifice of quantity. The old type had a smaller face carried by a type body larger than the face. Now the type face conforms with the type-body and we have the miracle of a larger type with no less matter. Every-body is the gainer.

The feature of the issue is its appeal to the home- constructor, who will glean from the article "What Can the Amateur Learn from the Manufacturer?" that the amateur has certain advantages and so, indeed, has the manufacturer, but from the amateur's special point of view he can be well content.

The Quadradyne, you will note, is a one-knobber using a four-gang condenser which automatically tunes four circuits. A band-pass coil and two screen-grid stages give great selectivity.

Opposed to this up-to-date set is a reminder of earlier practice which, however, as we learn from our correspondence, is still extremely popular; this is the New Plug-in Coil Three, with detector and two transformer-coupled low-frequency stages and obviously designed to use up those plug-in coils which most amateurs still have somewhere about.

Still another battery set is the Transportable Three, completely self-contained except for aerial and earth; a choke-coupled screen-grid valve, detector and pentode give both distance and volume, and here, again, the control is by one knob only.

We must not forget the Super 60, whose designer, W. James, has an article on the operation of the 1932 model, and, in addition, gives in another article instructions for building the 1932 A.C. Super 60, which

possesses the advantage that it uses the same parts as the battery model described last month, except, of course, for the addition of the mains gear.

All the juice comes from the mains—high tension, low tension, and grid bias. It uses a large power valve and gives great volume for both radio and gramophone reproduction.

A technical contribution of great interest is P. K. Turner's discussion of "economy push-pull," in which he shows how to obtain purity at comparatively low cost by using a special push-pull circuit.

Still another contribution of special merit is the talk by F. E. Henderson—a high authority in the valve world—about the variable-mu valve, the greatest development since the introduction of the screen-grid valve. Two such valves are used in the 1932 A.C. Super 60.

Our Technical Editor is explaining the working of the low-frequency filter. Such filters have very special uses and should be more generally used, particularly for cutting out needle scratch when playing records.

The newspapers are making far too much fuss about B.B.C. resignations and I am glad to see that our Special Commissioner puts the matter in a right perspective.

Of the many other special contributions to this issue space allows of my mentioning but one—the whole-page Broadcast Map of Europe with alphabetical guide showing the wavelengths of the most important stations.

You won't forget your blueprint privilege, will you? Any current blueprint for half price by observing the rules printed on the last page of the issue.

Yes, I think you will agree with me that this month's "quality and volume" are up to standard. I already have in hand two or three outstanding features for the March issue, and one of them is in the nature of a surprise.

B. E. J.

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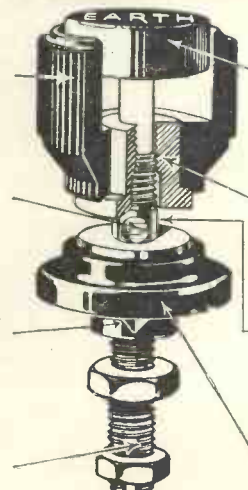
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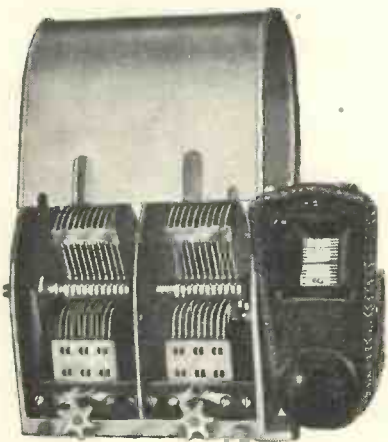
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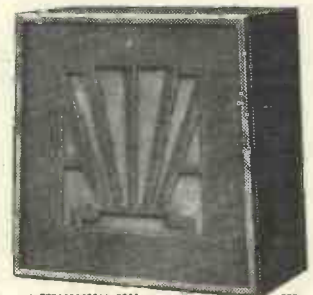
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# Valves to Use in Your Set

| Make                                 | Type       | Impedance | Amplification Factor | Filament Current | Mutual Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--------------------------------------|------------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>2-volt Three-electrode Valves</b> |            |           |                      |                  |                    |                            |                        |                        |
| Mazda                                | H210       | 59,000    | 47                   | .1               | .8                 | 5                          | 5                      | 1.0                    |
| Lissen                               | H210       | 58,000    | 35                   | .1               | .6                 | 1.1                        | 1.1                    | 1.5                    |
| Cossor                               | 210RC      | 50,000    | 40                   | .1               | 1.0                | 1.5                        | —                      | 1.5                    |
| Tungstram                            | R208       | 50,000    | 35                   | .1               | 1.0                | 1.0                        | —                      | 1.5                    |
| Six-Sixty                            | 210RC      | 45,400    | 50                   | .1               | 1.1                | 1.0                        | —                      | 1.5                    |
| Mullard                              | PM1A       | 41,600    | 50                   | .1               | 1.2                | .75                        | 1.5                    | 1.5                    |
| Marconi                              | H2         | 35,000    | 35                   | .1               | 1.0                | 1.0                        | —                      | 1.5                    |
| Osram                                | H2         | 35,000    | 35                   | .1               | 1.0                | 1.0                        | —                      | 1.5                    |
| Dario                                | Detector   | 30,000    | 30                   | .1               | 1.0                | 1.0                        | —                      | 1.5                    |
| Six-Sixty                            | 210HF      | 25,000    | 19                   | .1               | .75                | 1.5                        | —                      | —                      |
| Tungstram                            | H210       | 25,000    | 18                   | .1               | 1.0                | 2.0                        | 1.5                    | 3.0                    |
| Mullard                              | PM1HF      | 22,500    | 18                   | .1               | .8                 | 1.0                        | 3.0                    | 4.5                    |
| Cossor                               | 210HL      | 22,000    | 24                   | .1               | 1.1                | .75                        | 3.0                    | 4.5                    |
| Lissen                               | HL210      | 21,000    | 18                   | .1               | .85                | 2.2                        | 1.5                    | 4.5                    |
| Mazda                                | HL2        | 21,000    | 32                   | .1               | 1.5                | —                          | —                      | —                      |
| Dario                                | Super H.F. | 20,000    | 32                   | .1               | 1.6                | 2.0                        | —                      | 1.5                    |
| Mazda                                | HL210      | 18,500    | 26                   | .1               | 1.4                | 3.0                        | 1.5                    | 3.0                    |
| Marconi                              | HL2        | 18,000    | 27                   | .1               | 1.5                | 1.0                        | 1.5                    | 3.0                    |
| Osram                                | HL2        | 18,000    | 27                   | .1               | 1.5                | 1.0                        | 1.5                    | 1.0                    |
| Six-Sixty                            | 210HL      | 17,200    | 26                   | .1               | 1.5                | 2.0                        | —                      | 1.5                    |
| Tungstram                            | L210       | 16,000    | 16                   | .1               | 1.0                | 2.5                        | 3.0                    | 6.0                    |
| Cossor                               | 210HF      | 15,800    | 24                   | .1               | 1.5                | 2.25                       | 1.5                    | 3.0                    |
| Mullard                              | PM1HL      | 14,000    | 28                   | .1               | 2.0                | 1.2                        | 1.5                    | 3.0                    |
| Cossor                               | 210DET     | 13,000    | 15                   | .1               | 1.15               | 2.5                        | —                      | —                      |
| Six-Sixty                            | 210LF      | 12,500    | 10.6                 | .1               | .85                | 3.0                        | 4.5                    | 7.5                    |
| Mullard                              | PM1LF      | 12,000    | 11                   | .1               | .9                 | 2.6                        | 4.5                    | 7.5                    |
| Six-Sixty                            | 210D       | 10,600    | 17                   | .1               | 1.6                | 4.0                        | 3.0                    | 7.5                    |
| Cossor                               | 210LF      | 10,000    | 14                   | .1               | 1.4                | 3.0                        | 3.0                    | 4.5                    |
| Lissen                               | L210       | 10,000    | 10                   | .1               | 1.0                | 3.5                        | 3.0                    | 7.5                    |
| Marconi                              | L2/b       | 10,000    | 15.5                 | .1               | 1.55               | 4.0                        | —                      | —                      |
| Mullard                              | PM2DX      | 10,000    | 17                   | .1               | 1.7                | 2.0                        | 3.0                    | 6.0                    |
| Mazda                                | L210       | 10,000    | 17                   | .1               | 1.7                | 5.0                        | 2.5                    | 4.5                    |
| Mazda                                | L2         | 10,000    | 19                   | .1               | 1.9                | 3.0                        | —                      | 3.0                    |
| Tungstram                            | LG210      | 10,000    | 10                   | .1               | 1.0                | 4.0                        | 6.0                    | 9.0                    |
| Tungstram                            | PD220      | 10,000    | 17                   | .2               | 1.7                | 4.0                        | 4.5                    | 7.5                    |
| Dario                                | Universal  | 8,000     | 10                   | .1               | 1.25               | 3.5                        | —                      | 4.5                    |
| Dario                                | Super Det. | 7,500     | 15                   | .15              | 2.0                | 3.5                        | 3.0                    | 4.5                    |
| Six-Sixty                            | 220P       | 4,800     | 7.2                  | .2               | 1.5                | 5.0                        | 7.5                    | 12.0                   |
| Lissen                               | P220       | 4,700     | 7                    | .2               | 1.5                | 5.0                        | 9.0                    | 15.0                   |
| Mullard                              | PM2        | 4,400     | 7.5                  | .2               | 1.7                | 5.0                        | 7.5                    | 12.0                   |
| Cossor                               | 220P       | 4,000     | 8                    | .2               | 2.0                | 8.0                        | 4.5                    | 9.0                    |
| Cossor                               | 215P       | 4,000     | 9                    | .15              | 2.25               | 7.5                        | 3.0                    | 7.5                    |
| Cossor                               | 220Pa      | 4,000     | 16                   | .2               | 4.0                | 10.0                       | -3.0                   | 4.5                    |
| Marconi                              | LP2        | 3,900     | 15                   | .2               | 3.85               | 6.0                        | —                      | —                      |
| Osram                                | LP2        | 3,900     | 15                   | .2               | 3.85               | 6.0                        | 3.0                    | 4.5                    |
| Mazda                                | P220       | 3,700     | 12.5                 | .2               | 3.4                | 11.0                       | 3.0                    | 6.0                    |
| Six-Sixty                            | 22PA       | 3,700     | 13                   | .2               | 3.5                | 10.0                       | 3.0                    | 6.0                    |
| Mullard                              | PM2A       | 3,600     | 12.5                 | .2               | 3.5                | 6.5                        | 3.0                    | 6.0                    |
| Tungstram                            | P215       | 3,300     | 5                    | .2               | 1.5                | 12.0                       | 9.0                    | 12.0                   |
| Dario                                | Super P'r  | 3,000     | 6                    | .18              | 2.0                | 8.5                        | 12.0                   | 15.0                   |
| Marconi                              | P240       | 2,500     | 4                    | .4               | 1.6                | 12.0                       | 15.0                   | 24.0                   |
| Osram                                | P240       | 2,500     | 4                    | .4               | 1.6                | 11.0                       | 16.0                   | 24.0                   |
| Tungstram                            | SP230      | 2,500     | 5                    | .3               | 2.0                | 15.0                       | 15.0                   | 23.0                   |
| Dario                                | Super P'r  | 2,400     | 7                    | .3               | 3.0                | 14.0                       | 12.0                   | 18.0                   |
| Tungstram                            | P220       | 2,200     | 6.6                  | .2               | 3.0                | 5.0                        | 9.0                    | 12.0                   |
| Marconi                              | P2         | 2,150     | 7.5                  | .2               | 3.5                | —                          | —                      | —                      |
| Osram                                | P2         | 2,150     | 7.5                  | .2               | 3.5                | 10.0                       | 7.5                    | 10.5                   |
| Six-Sixty                            | 220SP      | 2,060     | 7                    | .2               | 3.4                | —                          | —                      | —                      |
| Mullard                              | PM202      | 2,000     | 7.0                  | .2               | 3.5                | 14.0                       | 7.5                    | 15.0                   |
| Lissen                               | PX240      | 2,000     | 4                    | .4               | 2.0                | 14.0                       | 12.5                   | 22.5                   |
| Mazda                                | P240       | 1,900     | 7                    | .4               | 3.7                | 18.0                       | 6.0                    | 13.5                   |
| Mullard                              | PM252      | 1,900     | 7                    | .4               | 3.7                | 14.0                       | 6.0                    | 12.0                   |
| Six-Sixty                            | 240SP      | 1,900     | 6.6                  | .4               | 3.5                | 16.0                       | 4.5                    | 13.5                   |
| Marconi                              | P21h       | 1,850     | 6.5                  | .2               | 3.5                | 15.0                       | —                      | —                      |
| Cossor                               | 230XP      | 1,500     | 4.5                  | .3               | 3.0                | 18.0                       | 9.0                    | 18.0                   |

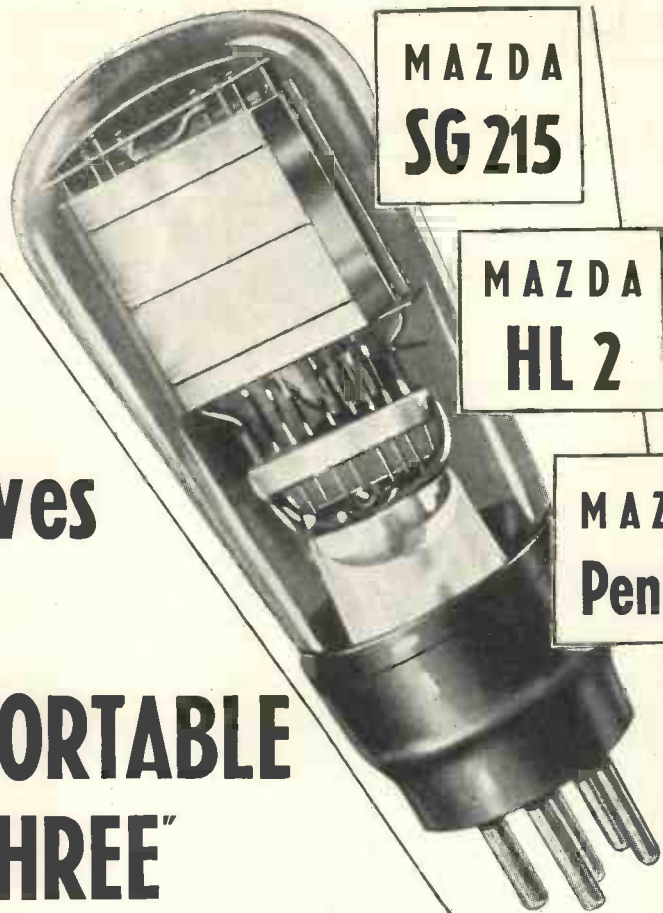
| <b>2-volt Double-grid Valves</b> |       |       |     |    |     |     |   |   |
|----------------------------------|-------|-------|-----|----|-----|-----|---|---|
| Tungstram                        | DG210 | 5,000 | 5.0 | .1 | 1.0 | 1.0 | — | — |
| Marconi                          | DG2   | 3,750 | 4.5 | .2 | 1.2 | —   | — | — |
| Osram                            | DG2   | 3,750 | 4.5 | .2 | 1.2 | —   | — | — |
| Cossor                           | 210DG | 3,400 | 2.7 | .1 | .8  | —   | — | — |
| Six-Sixty                        | 210DG | —     | —   | .1 | .8  | —   | — | — |
| Mullard                          | PM1DG | —     | —   | .1 | .8  | —   | — | — |

| <b>2-volt Screen-grid Valves</b> |        |         |     |     |      |      |     |     |
|----------------------------------|--------|---------|-----|-----|------|------|-----|-----|
| Tungstram                        | S210   | 430,000 | 300 | .12 | .8   | —    | —   | —   |
| Mazda                            | S215SG | 400,000 | 450 | .15 | 1.1  | —    | 1.5 | —   |
| Mazda                            | S215B  | 333,000 | 500 | .15 | 1.5  | 2.0  | —   | —   |
| Cossor                           | S215SG | 300,000 | 330 | .15 | 1.1  | 1.25 | —   | 1.5 |
| Six-Sixty                        | S215SG | 220,000 | 190 | .15 | .87  | 2.0  | —   | —   |
| Cossor                           | S220SG | 200,000 | 320 | .2  | 1.6  | 1.5  | —   | 1.5 |
| Dario                            | S.G.   | 200,000 | 200 | .15 | 1.0  | 3.0  | —   | —   |
| Osram                            | S22    | 200,000 | 350 | .2  | 1.75 | —    | —   | —   |
| Lissen                           | SG215  | 200,000 | 180 | .15 | .9   | —    | —   | 1.5 |
| Marconi                          | S22    | 200,000 | 350 | .2  | 1.75 | —    | —   | —   |
| Marconi                          | S21    | 200,000 | 220 | .1  | 1.1  | —    | —   | —   |
| Osram                            | S21    | 200,000 | 220 | .1  | 1.1  | 3.0  | —   | —   |
| Mullard                          | PM12   | 180,000 | 200 | .15 | 1.1  | —    | —   | —   |
| Mazda                            | S215A  | —       | 800 | .15 | 1.1  | —    | —   | —   |

| <b>Variable-mu 2-volt Screen-grid Valve</b> |        |         |   |    |     |   |   |   |
|---|--------|---------|---|----|-----|---|---|---|
| Cossor                                      | 220VSG | 110,000 | — | .2 | 1.6 | — | — | — |

| Make                         | Type    | Impedance | Amplification Factor | Filament Current | Mutual Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|------------------------------|---------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>2-volt Pentode Valves</b> |         |           |                      |                  |                    |                            |                        |                        |
| Lissen                       | PT225   | 64,000    | 90                   | .25              | 1.4                | 7.0                        | 3.0                    | 6.0                    |
| Six-Sixty                    | 230PP   | 64,000    | 80                   | .3               | 1.25               | 10.0                       | 6.0                    | 12.0                   |
| Mullard                      | PM22    | —         | —                    | .3               | 1.3                | 9.0                        | 6.0                    | 10.0                   |
| Marconi                      | PT240   | 55,000    | 90                   | .4               | 1.65               | 12.0                       | 6.0                    | 9.0                    |
| Tungstram                    | PP230   | 33,000    | 50                   | .3               | 1.5                | 10.0                       | 9.0                    | 16.0                   |
| Lissen                       | PT240   | 22,500    | 45                   | .4               | 2.0                | 12.5                       | 7.5                    | 10.5                   |
| Cossor                       | 230PT   | —         | —                    | .3               | 2.0                | 13.0                       | 12.0                   | 15.0                   |
| Mazda                        | 220P-n  | —         | —                    | .2               | 2.5                | —                          | —                      | —                      |
| Cossor                       | 230HPT  | —         | —                    | .3               | 1.8                | 6.5                        | 7.5                    | 7.5                    |
| Osram                        | PT2     | —         | —                    | .2               | 2.5                | 5.0                        | 3.0                    | 4.5                    |
| Mazda                        | Pen.230 | —         | —                    | .3               | 1.5                | —                          | —                      | —                      |
| Marconi                      | PT2     | —         | —                    | .2               | 2.5                | 5.0                        | 3.0                    | 4.5                    |

| <b>4-volt Three-electrode Valves</b> |            |        |      |      |      |      |     |      |
|--------------------------------------|------------|--------|------|------|------|------|-----|------|
| Dario                                | Resistron  | 60,000 | 30   | .075 | .5   | .25  | —   | 1.5  |
| Marconi                              | H410       | 60,000 | 40   | .1   | .66  | .5   | —   | 1.5  |
| Osram                                | H410       | 60,000 | 40   | .1   | .66  | .35  | —   | 1.5  |
| Lissen                               | H410       | 60,000 | 40   | .1   | .66  | .16  | —   | 1.5  |
| Six-Sixty                            | 4075RC     | 58,000 | 37   | .075 | .64  | 1.5  | 1.0 | 1.5  |
| Mullard                              | PM3A       | 55,000 | 38   | .075 | .66  | .3   | 1.5 | 1.5  |
| Cossor                               | 410RC      | 50,000 | 40   | .1   | .8   | —    | —   | 3.0  |
| Marconi                              | HL410      | 30,000 | 25   | .1   | .83  | 1.0  | 2.0 | 3.0  |
| Tungstram                            | H407       | 25,000 | 35   | .07  | 1.4  | 2.5  | 1.5 | 2.0  |
| Dario                                | Super H.F. | 21,000 | 25   | .075 | 1.2  | 2.0  | —   | 1.5  |
| Lissen                               | HLD410     | 21,000 | 25   | .1   | 1.2  | 2.5  | 1.5 | 3.0  |
| Osram                                | HL410      | 20,800 | 22   | .1   | 1.2  | 1.25 | 1.5 | 3.0  |
| Cossor                               | 410HF      | 20,000 | 22   | .1   | 1.1  | 1.0  | 1.5 | 3.0  |
| Tungstram                            | R406       | 18,000 | 25   | .06  | 1.4  | 3.5  | 2.0 | 3.5  |
| Tungstram                            | HR406      | 17,000 | 25   | .065 | 1.5  | 1.5  | 1.5 | 3.0  |
| Tungstram                            | HR410      | 17,000 | 25   | .1   | 1.5  | 1.5  | 1.5 | 3.0  |
| Mullard                              | PM3        | 13,000 | 14   | .075 | 1.05 | 2.0  | 3.0 | 6.0  |
| Six-Sixty                            | 4075HF     | 12,500 | 13.5 | .075 | 1.1  | 3.0  | 3.0 | 4.5  |
| Cossor                               | 410LF      | 10,000 | 17   | .1   | 1.7  | 2.5  | 1.5 | 4.5  |
| Dario                                | Universal  | 10,000 | 10   | .075 | 1.0  | 3.0  | —   | 4.5  |
| Tungstram                            | LD408      | 8,500  | 17   | .085 | 2.0  | 3.5  | 3.0 | 4.5  |
| Lissen                               | L410       | 8,500  | 15   | .1   | 1.8  | 3.5  | 1.5 | 4.5  |
| Marconi                              | L410       | 8,500  | 15   | .1   | 1.77 | 3.0  | 2.0 | 4.5  |
| Osram                                | L410       | 8,500  | 15   | .1   | 1.77 | 3.5  | 3.0 | 4.5  |
| Dario                                | Super Det. | 7,500  | 15   | .075 | 2.0  | 3.0  | —   | 4.5  |
| Mullard                              | PM4DX      | 7,500  | 15   | .1   | 2.0  | 2.0  | 3.0 | 6.0  |
| Six-Sixty                            | 410D       | 7,250  | 14.5 | .1   | 2.0  | 4.0  | 3.0 | 6.0  |
| Tungstram                            | LD410      | 7,000  | 16.5 | .1   | 2.3  | 4.5  | 4.5 | 7.5  |
| Marconi                              | P410       | 5,000  | 7.5  | .1   | 1.5  | 6.0  | 6.0 | 10.5 |
| Osram                                | P410       | 5,000  | 7.5  | .1   | 1.5  | 6.0  | 6.0 | 10.5 |
| Dario                                | Super P'r  | 4,500  | 9    | .1   | 2.0  | 7.0  | —   | 15.0 |
| Six-Sixty                            | 410P       | 4,100  | 7.8  | .1   | 1.9  | 7.5  | 7.5 | 12.0 |
| Marconi                              | 410P       | 4,000  | 8    | .1   | 2.0  | 8.0  | 4.5 | 9.0  |
| Mullard                              | PM4        | 4,000  | 8    | .1   | 2.0  | 7.5  | 5.0 | 8.0  |
| Tungstram                            | L414       | 3,300  | 10   | .15  | 3.0  | 6.0  | 6.5 | 9.0  |
| Marconi                              | P425       | 2,300  | 4.5  | .25  | 1.95 | 14.0 | 9.0 | 16.5 |
| Lissen                               | P425       | 2,250  | 4.5  | .2   |      |      |     |      |



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# VALVES TO USE IN YOUR SET—Continued from page 4

| Make                                   | Type    | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--|---------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>4-volt Pentode Valves—Continued</b> |         |           |                      |                  |                    |                            |                        |                        |
| Mazda ..                               | 425Pen. | —         | —                    | .25              | 1.0                | 14.0                       | 14.0                   | —                      |
| Mullard..                              | PM24C   | —         | —                    | 1.0              | 3.0                | —                          | —                      | —                      |

| Make                                 | Type   | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--------------------------------------|--------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>6-volt Three-electrode Valves</b> |        |           |                      |                  |                    |                            |                        |                        |
| Mazda ..                             | H607   | 90,000    | 40                   | .07              | .45                | 1.0                        | .8                     | 1.5                    |
| Cossor ..                            | 610RC  | 50,000    | 40                   | .1               | .8                 | .75                        | —                      | 1.5                    |
| Lissen ..                            | H610   | 60,000    | 40                   | .1               | .66                | 1.0                        | —                      | 1.5                    |
| Marconi ..                           | H610   | 60,000    | 40                   | .1               | .66                | .35                        | 1.5                    | 1.5                    |
| Osram ..                             | H610   | 60,000    | 40                   | .1               | .7                 | .35                        | —                      | 3.0                    |
| Six-Sixty                            | 6075RC | 58,000    | 42                   | .075             | .7                 | 1.1                        | 1.0                    | 1.5                    |
| Mullard..                            | PM5B   | 49,000    | 40                   | .075             | .85                | .5                         | 1.5                    | 1.5                    |
| Marconi ..                           | HL610  | 30,000    | 30                   | .1               | 1.0                | 1.0                        | 1.5                    | 1.5                    |
| Osram ..                             | HL610  | 30,000    | 30                   | .1               | 1.0                | 1.0                        | 1.5                    | 1.5                    |
| Osram ..                             | LS5B   | 25,000    | 20                   | .8               | .8                 | —                          | —                      | —                      |
| Lissen ..                            | LHD610 | 21,000    | 25                   | .1               | 1.2                | 2.5                        | 1.5                    | 3.0                    |
| Cossor ..                            | 610HF  | 20,000    | 20                   | .07              | 1.0                | 1.75                       | 1.5                    | 3.0                    |
| Mazda ..                             | HL610  | 20,000    | 26                   | .075             | 1.3                | 1.0                        | 1.5                    | 3.0                    |
| Mullard..                            | PM5D   | 20,000    | 27                   | .075             | 1.1                | 2.0                        | 2.0                    | 4.0                    |
| Six-Sixty                            | 607HF  | 15,200    | 17                   | .075             | 1.1                | 2.0                        | 2.0                    | 3.0                    |
| Tungsram                             | HR607  | 15,000    | 30                   | .07              | 2.0                | 2.0                        | 1.5                    | 3.0                    |
| Mullard..                            | PM5X   | 14,700    | 17.5                 | .075             | 1.2                | 1.6                        | 3.0                    | 4.5                    |
| Six-Sixty                            | D610   | 9,250     | 18.5                 | .1               | 2.0                | 3.0                        | 3.0                    | 4.0                    |
| Lissen ..                            | L610   | 9,000     | 18                   | .1               | 2.0                | 2.0                        | 3.0                    | 4.5                    |
| Mullard..                            | PM6D   | 9,000     | 18                   | .1               | 2.0                | 2.0                        | 3.0                    | 4.5                    |
| Tungsram                             | LG607  | 9,000     | 16.5                 | .07              | 1.8                | 3.5                        | 3.0                    | 4.5                    |
| Cossor ..                            | 610LF  | 7,500     | 15                   | .1               | 2.0                | 3.4                        | 1.5                    | 4.5                    |
| Marconi ..                           | L610   | 7,500     | 15                   | .1               | 2.0                | 3.0                        | 2.0                    | 4.0                    |
| Osram ..                             | L610   | 7,500     | 15                   | .1               | 2.0                | 3.5                        | 1.5                    | 4.5                    |
| Osram ..                             | LS5    | 6,000     | 5                    | .8               | .8                 | —                          | —                      | —                      |
| Lissen ..                            | P610   | 4,000     | 8                    | .1               | 2.0                | 6.0                        | 6.0                    | 16.0                   |
| Mullard..                            | PM6    | 3,550     | 8                    | .1               | 2.25               | 7.0                        | 6.0                    | 9.0                    |
| Cossor ..                            | 610P   | 3,500     | 8                    | .1               | 2.28               | 8.0                        | 3.0                    | 7.5                    |
| Marconi ..                           | P610   | 3,500     | 8                    | .1               | 2.28               | 6.0                        | 6.0                    | 9.0                    |
| Osram ..                             | P610   | 3,500     | 8                    | .1               | 2.28               | 6.0                        | 6.0                    | 9.0                    |
| Six-Sixty                            | 610P   | 3,400     | 7.8                  | .1               | 2.3                | 8.0                        | 6.0                    | 9.0                    |
| Tungsram                             | P615   | 3,300     | 10                   | .15              | 3.0                | 10.0                       | 4.5                    | 7.5                    |
| Marconi ..                           | LS5A   | 2,750     | 2.5                  | .8               | .9                 | —                          | —                      | —                      |
| Osram ..                             | LS5A   | 2,750     | 2.5                  | .8               | .9                 | —                          | —                      | —                      |
| Cossor ..                            | 625P   | 2,500     | 7                    | .25              | 2.8                | 13.0                       | 3.0                    | 9.0                    |
| Lissen ..                            | P625   | 2,500     | 7.5                  | .25              | 3.0                | 8.0                        | 7.5                    | 12.0                   |
| Mazda ..                             | P625B  | 2,500     | 7                    | .25              | 2.8                | 11.0                       | 6.0                    | 12.0                   |
| Marconi ..                           | P625   | 2,400     | 6                    | .25              | 2.5                | 11.0                       | 6.0                    | 24.0                   |
| Osram ..                             | P625   | 2,400     | 6                    | .25              | 2.5                | 11.0                       | 6.0                    | 12.0                   |
| Tungsram                             | SP614  | 2,300     | 6                    | .15              | 2.6                | 17.0                       | 6.0                    | 18.0                   |
| Cossor ..                            | 610XP  | 2,000     | 5                    | .1               | 2.5                | 22.0                       | 7.5                    | 15.0                   |
| Mullard..                            | PM256  | 1,850     | 6                    | .25              | 3.25               | 8.0                        | 9.0                    | 27.0                   |
| Six-Sixty                            | 625SP  | 1,780     | 5.8                  | .25              | 3.25               | —                          | —                      | 15.0                   |
| Marconi ..                           | P625A  | 1,600     | 3.7                  | .25              | 2.3                | 20.0                       | 13.5                   | 36.0                   |
| Mazda ..                             | P625A  | 1,600     | 4                    | .25              | 2.5                | 27.0                       | 10.0                   | 20.0                   |
| Osram ..                             | P625A  | 1,600     | 3.7                  | .25              | 2.3                | 16.0                       | 13.5                   | 24.0                   |
| Lissen ..                            | P625A  | 1,500     | 4.5                  | .25              | 3.0                | 12.0                       | 13.5                   | 24.0                   |
| Six-Sixty                            | 625SPA | 1,500     | 3.9                  | .25              | 2.6                | 25.0                       | 12.0                   | 22.5                   |
| Cossor ..                            | 620T   | 1,400     | 3.2                  | .2               | 2.3                | —                          | —                      | —                      |
| Mullard..                            | PM256A | 1,400     | 3.6                  | .25              | 2.6                | 20.0                       | 12.0                   | 33.0                   |
| Marconi ..                           | LS6A   | 1,300     | 3.0                  | 2.0              | 2.3                | —                          | —                      | —                      |
| Mazda ..                             | P650   | 1,300     | 3.5                  | .5               | 2.7                | 30.0                       | 12.0                   | 25.0                   |
| Osram ..                             | LS6A   | 1,300     | 3.0                  | 2.0              | 2.3                | —                          | —                      | —                      |
| Tungsram                             | P460   | 1,100     | 4                    | .6               | 3.5                | 50.0                       | 14.0                   | 22.0                   |
| Marconi ..                           | DA60   | 835       | 2.5                  | 4.0              | 3.0                | —                          | —                      | —                      |
| Osram ..                             | DA60   | 835       | 2.5                  | 4.0              | 3.0                | —                          | —                      | —                      |

| Make                             | Type     | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|----------------------------------|----------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>6-volt Screen-grid Valves</b> |          |           |                      |                  |                    |                            |                        |                        |
| Six-Sixty                        | SS6075SG | 210,000   | 190                  | .075             | .9                 | —                          | —                      | —                      |
| Cossor ..                        | 610SG    | 200,000   | 200                  | .1               | 1.0                | —                          | —                      | 1.5                    |
| Mullard..                        | PM16     | 200,000   | 200                  | .075             | 1.0                | —                          | —                      | —                      |
| Osram ..                         | S610     | 200,000   | 210                  | .1               | 1.05               | 4.0                        | 1.5                    | —                      |

| Make                         | Type    | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|------------------------------|---------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>6-volt Pentode Valves</b> |         |           |                      |                  |                    |                            |                        |                        |
| Marconi                      | PT625   | 42,000    | 80                   | .25              | 1.85               | 10.0                       | 6.0                    | 15.0                   |
| Osram ..                     | PT625   | 42,000    | 80                   | .25              | 1.85               | —                          | —                      | —                      |
| Tungsram                     | PP610   | 40,000    | 60                   | .1               | 1.6                | 10.0                       | 6.0                    | 10.0                   |
| Six-Sixty                    | SS617PP | 28,500    | 54                   | .17              | 1.9                | 35.0                       | 8.0                    | 14.0                   |
| Mullard..                    | PM26    | —         | —                    | .17              | 2.0                | 15.0                       | 9.0                    | 15.0                   |
| Lissen ..                    | PT624   | 24,000    | 60                   | .25              | 2.5                | 14.0                       | 7.5                    | 15.0                   |
| Cossor ..                    | 615PT   | —         | —                    | .15              | 1.5                | 17.0                       | 6.9                    | 7.5                    |

| Make                                     | Type      | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--|-----------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>A.C. Three-electrode Mains Valves</b> |           |           |                      |                  |                    |                            |                        |                        |
| Cossor ..                                | 41MHF     | 24,500    | 41                   | 1.0              | 2.8                | 2.5                        | 1.5                    | 2.0                    |
| Dario ..                                 | Sup. H.F. | 20,000    | 40                   | 1.0              | 2.0                | 4.5                        | —                      | 1.5                    |
| Cossor ..                                | 41MRC     | 19,500    | 50                   | 1.0              | 2.6                | 2.0                        | .5                     | 1.5                    |
| Cossor ..                                | 41MH      | 18,000    | 72                   | 1.0              | 4.0                | 2.0                        | 1.0                    | 1.5                    |
| Six-Sixty                                | 4DX.AC    | 17,700    | 85                   | 1.0              | 4.8                | —                          | —                      | —                      |
| Mullard..                                | 904V      | 17,000    | 85                   | 1.0              | 5.0                | 3.0                        | .75                    | 1.0                    |
| Tungsram                                 | AR495     | 17,000    | 85                   | 1.0              | 5                  | 4.0                        | 1.5                    | 1.5                    |
| Tungsram                                 | AR4100    | 16,000    | 33                   | 1.0              | 2.0                | 2.5                        | —                      | 3.0                    |
| Mazda ..                                 | AC/HL     | 13,500    | 35                   | 1.0              | 3.0                | 4.5                        | 1.5                    | 3.0                    |

| Make   | Type       | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--|------------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>A.C. Three-electrode Mains Valves—Continued</b> |            |           |                      |                  |                    |                            |                        |                        |
| Tungsram   | AR4101     | 13,300    | 40                   | 1.0              | 3                  | 2.5                        | 1.5                    | 1.4                    |
| Six-Sixty  | 4GP.AC     | 12,000    | 36                   | 1.0              | 3.0                | —                          | —                      | —                      |
| Cossor ..  | 41MHL      | 11,500    | 52                   | 1.0              | 4.5                | 3.0                        | .9                     | 1.5                    |
| Mazda ..   | AC2HL      | 11,500    | 75                   | 1.0              | 6.5                | 3.0                        | —                      | 1.5                    |
| Marconi ..   | MH4        | 11,100    | 40                   | 1.0              | 3.6                | 4.0                        | 1.5                    | 3.0                    |
| Osram ..   | MH4        | 11,100    | 40                   | 1.0              | 3.6                | 4.0                        | 1.5                    | 3.0                    |
| Mullard..  | 354V       | 10,000    | 35                   | 1.0              | 3.5                | 2.0                        | 2.0                    | 3.0                    |
| Marconi ..   | MHL/4      | 8,000     | 20                   | 1.0              | 2.5                | 5.0                        | 3.0                    | 6.0                    |
| Osram ..   | MHL4       | 8,000     | 20                   | 1.0              | 2.5                | 5.0                        | 3.0                    | 6.0                    |
| Tungsram   | AG4100     | 8,000     | 16                   | 1.0              | 2.0                | 5.0                        | —                      | —                      |
| Cossor ..  | M41LF      | 7,900     | 15                   | 1.0              | 1.9                | 4.5                        | 4.5                    | 6.0                    |
| Dario ..   | Super Det. | 7,500     | 15                   | 1.0              | 2.0                | 6.0                        | 3.0                    | 4.5                    |
| Six-Sixty  | SS4Det.AC  | 7,000     | 16                   | 1.0              | 2.3                | 7.5                        | 3.5                    | 8.0                    |
| Tungsram   | AG495      | 6,250     | 25                   | 1.0              | 4.0                | 4.0                        | 3.0                    | 4.5                    |
| Cossor ..  | M41P       | 5,000     | 16                   | 1.0              | 2.0                | 6.5                        | 4.5                    | 7.5                    |
| Six-Sixty  | 4L.AC      | 5,000     | 10                   | 1.0              | 3.2                | —                          | —                      | —                      |
| Mullard..  | 164V       | 4,850     | 16                   | 1.0              | 3.3                | 5.0                        | 4.5                    | 6.5                    |
| Six-Sixty  | SS4PAC     | 3,000     | 10                   | 1.0              | 3.3                | 10.0                       | 5.9                    | 8.0                    |
| Mazda ..   | PP3/425    | 2,900     | 7.5                  | 1.25             | 2.9                | —                          | —                      | 100                    |
| Osram ..   | ML4        | 2,860     | 12                   | 1.0              | 4.2                | 12.0                       | 5.0                    | 8.0                    |
| Mullard..  | 104V       | 2,850     | 10                   | 1.0              | 3.5                | 11.0                       | 5.0                    | 8.5                    |
| Marconi ..   | ML4        | 2,800     | 12                   | 1.0              | 2.5                | —                          | —                      | —                      |
| Mazda ..   | AC/P       | 2,650     | 10                   | 1.0              | 3.75               | 14.0                       | 6.0                    | 12.0                   |
| Cossor ..  | 41MP       | 2,500     | 18.7                 | 1.0              | 7.5                | 15.0                       | 3.0                    | 5.0                    |
| Tungsram   | AP495      | 2,500     | 10                   | 1.0              | 4.0                | 20.0                       | 9.0                    | 12.5                   |
| Dario ..   | Mag. P'r   | 2,200     | 8.5                  | .3               | 3.8                | 15.0                       | 15.0                   | 24.0                   |
| Cossor ..  | 41XP       | 2,000     | 4                    | 1.0              | 2.0                | 15.0                       | 12.0                   | 19.5                   |
| Mullard..  | AC064      | 2,000     | 6                    | 1.0              | 3.0                | 15.0                       | 9.0                    | 14.0                   |
| Tungsram   | P430       | 2,000     | 5                    | .3               | 2.5                | 20.0                       | —                      | —                      |
| Cossor ..  | 41MXP      | 1,500     | 11.2                 | 1.0              | 7.5                | 23.0                       | 6.0                    | 9.0                    |
| Mazda ..   | PP5/400    | 1,500     | 4                    | 2.0              | 6.0                | —                          | —                      | 32.0                   |
| Mazda ..   | AC/P1      | 1,450     | 5.4                  | 1.0              | 3.7                | —                          | —                      | —                      |
| Six-Sixty  | HV4/1      | 1,450     | 6.3                  | 1.0              | 3.0                | —                          | —                      | 14.0                   |
| Tungsram   | P4100      | 1,400     | 7                    | 1.0              | 5.0                | 35.0                       | —                      | 35.0                   |
| Mullard..  | AC044      | 1,150     | 4                    | .7               | 3.5                | 17.0                       | 14.0                   | 23.0                   |
| Tungsram   | P460       | 1,100     | 4                    | .6               | 3.5                | 50.0                       | 14.0                   | 22.0                   |

| Make                           | Type   | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--------------------------------|--------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>A.C. Double-grid Valves</b> |        |           |                      |                  |                    |                            |                        |                        |
| Cossor ..                      | 41MDG  | 40,000    | 10                   | 1.0              | .25                | —                          | —                      | —                      |
| Tungsram                       | DG4100 | 5,000     | 5                    | 1.0              | 1.0                | 3.0                        | —                      | —                      |

| Make                                 | Type   | Impedance | Amplification Factor | Filament Current | Normal Conductance | Anode Current at 120 volts | Grid Bias at 100 volts | Grid Bias at 150 volts |
|--------------------------------------|--------|-----------|----------------------|------------------|--------------------|----------------------------|------------------------|------------------------|
| <b>A.C. Screen-grid Mains Valves</b> |        |           |                      |                  |                    |                            |                        |                        |
| Dario ..                             | ACSG   | 1,000,000 | 1,000                | 1.0              | 1.5                | —                          | —                      | —                      |
| Six-Sixty                            | 4SGAC  | 1,000,000 | 1,000                | 1.0              | 1.0                | 1.5                        | —                      | —                      |
| Mullard..                            | SV4    | 909,000   | 1,000                | 1.0              | 1.1                | —                          | —                      | —                      |
| Mazda ..                             | AC/SG  | 800,000   | 1,200                | 1.0              | 3.0                | 5.0                        | .5                     | .5                     |
| Tungsram                             | AS494  | 667,000   | 1,000                | 1.0              | 1.5                | 1.5                        | —                      | —                      |
| Mazda ..                             | ACS2   | 600,000   | 3,000                | 1.0              | 5.0                | —                          | —                      | —                      |
| Cossor ..                            | MSG/HA | 500,000   | 1,000                |                  |                    |                            |                        |                        |

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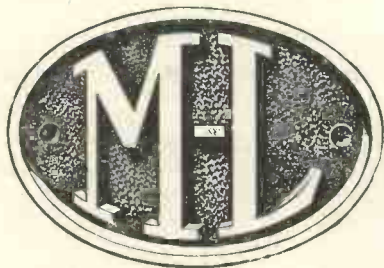
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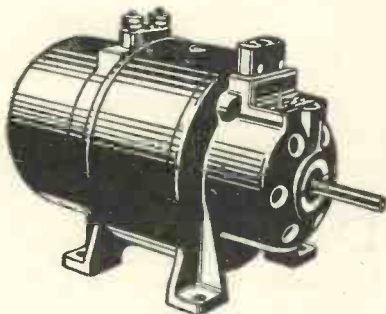


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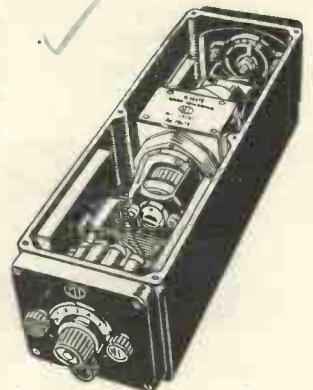
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16/6



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P. T. PARSONS  
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(G. P. Kendall,)  
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# FOR HIGH TENSION

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# GUIDE TO THE WORLD'S BROADCASTERS

Specially Compiled for "Wireless Magazine" by JAY COOTE

**31.28 Metres** **SYDNEY (VK2ME)** **9,590**  
**Power:** **20 Kw.** **(New South Wales)** **Kilocycles**

**Distance from London:** Approximately 10,550 miles.  
**Standard Time:** Ten hours IN ADVANCE of Greenwich Mean Time.  
**Announcer:** Man.  
**Opening Signal:** Laugh of the lyrebird (Kookaburra) reproduced on sound film.  
**Call:** "This is VK2ME, the Australian National Empire short-wave broadcasting station on 31.28 metres."  
**Times of Transmission:** From G.M.T. 14.30 to 16.30 (Sundays), for the benefit of Great Britain, Western Europe, British East Africa, South Africa, and Egypt. Other broadcasts are made between 10.00 and 12.00 (noon) G.M.T. for New Zealand, Fiji, and the Western Pacific; from 12.00 (noon) to 14.00 for Western Australia, India, Burma, Ceylon, etc.; and at 18.00 to 20.00 for Canada and the American Continent.  
 Closes down with call, bird signal, and "God Save the King."

**31.51 Metres** **SKAMLEBAEK (OXY)** **9,520**  
**Power:** **500 watts** **(Denmark)** **Kilocycles**

**Distance from London:** Approximately 598 miles.  
**Standard Time:** Central European (G.M.T. PLUS one hour).  
**Announcer:** Man.  
**Opening Signal:** Musical-box melody (short carillon).  
**Call:** "Kobenhavn, Kalundborg og Danmarks kortbolgosannor" (short-wave transmitter).  
 Relays Copenhagen programmes from 19.00 G.M.T. daily.  
 Closes down with the words; "Hermed er programmet slut for iaften; vi meddeler dem programmet for imorgen (Here with we close our to-day's programme; we give you to-morrow's programme). Gien ikke at soette antennen (Remember to earth your aerials). God Nat. God Nat."

**49.05 Metres** **CHI-HOA (F31CD) SAIGON** **6,116**  
**Power:** **12 Kw.** **(French Indo-China)** **Kilocycles**

**Distance from London:** Approximately 5,500 miles.  
**Standard Time:** Greenwich Mean Time PLUS seven hours.  
**Announcers:** Man and woman.  
**Call:** "Allo! Allo! Ici Radio Saigon" (phon.: Say-ee-gong).  
 Announcements and news bulletins are given out in the French, English, and Chinese languages.  
**Opening and Interval Signal:** Gong.  
**Times of Transmission:** Daily (except Wednesday), G.M.T. 11.30 to 12.45, news, native orchestra; 12.45 to 14.00, news and gramophone records; 14.00 to 15.00, concert by Radio Saigon Orchestra. On Wednesdays, G.M.T. 11.30 to 12.30, concert; 12.30 to 13.45, news and gramophone records; 13.45 to 15.15, news and native orchestra.  
 Closes down with a time signal and good-night greetings in French and English, followed by "La Marseillaise."  
 Chi-Hoa (Saigon) also transmits on 25.46 metres, but this channel is reserved for a daily public wireless-telephony service with Australia, Japan, Dutch East Indies, France, Algeria, Morocco, Tunis, etc.

**80 Metres** **PRATO SMERALDO ROME** **Kilocycles**  
**Power:** **14 Kw.** **(3RO)** **(Italy)** **3,750**

**Distance from London:** Approximately 890 miles.  
**Standard Time:** Central European (G.M.T. PLUS one hour).  
**Announcer:** Woman.  
**Call (phon.):** "Eh-yar Rah-dee-owe Roma."  
**Opening and Interval Signal:** As Rome high-power station (1RO), q.v.  
 Relays programmes from Rome, Naples, Milan, Turin, and Trieste.  
 Closes down with the words; "Fine della trasmissione. Buona notte a tutti," followed by Royal Anthem ("Marcia Reale") and Fascist hymn ("Giovinazza").

**327.5 Metres** **POSTE PARISIEN** **916**  
**Power:** **1.2 Kw.** **(Paris, France)** **Kilocycles**

**Distance from London:** Approximately 214 miles.  
**Standard Time:** Greenwich Mean Time (France adopts B.S.T.).  
**Announcer:** Man. French language only used.  
**Opening Signal:** Gramophone record.  
**Call:** "Ici Poste Parisien." No special interval signal.  
**Daily Transmissions:** G.M.T. 10.15, gramophone records, news (Tuesday only); 20.00, dance music (Friday); 20.15, gramophone records, news, concert.  
 Closes down with usual French formula, followed by "La Marseillaise."

**488.6 Metres** **PRAGUE** **Kilocycles**  
**Power:** **120 Kw.** **(Czechoslovakia)** **614**

**Distance from London:** Approximately 635 miles.  
**Standard Time:** Central European (G.M.T. PLUS one hour).  
**Announcers:** Man and woman.  
**Opening Call:** "Allo! Praha"; when with relays: "Allo Praha, Brno, Bratislava, Moravska-Ostrava, Koscie." Announcements are frequently made in Czech, German, French, and English.  
**Interval Signal:** Long-drawn-out note (A).  
**Main Daily Programme:** G.M.T. 06.30, relay of concert from Carlsbad (Sunday); 10.30, gramophone records, then throughout day until 17.30, concert; 18.00, relay of carillon from the Church of Ludmilla; 20.00, time signal, main evening entertainment; 21.00, relay of dance music or concert; 22.00, carillon.  
 Closes down with good-night greetings in Czech ("Dobrou noc"), German, French, and English.  
**Relays:** Brno, 341.7 m. (878 kcs.), 36 kw.; Kosice, 293 m. (1,022 kcs.), 2.5 kw.; Bratislava, 278.8 m. (1,076 kcs.), 14 kw.; Moravska, Ostrava, 263.8 m. (1,137 kcs.), 11 kw.; and Prague No. 2, 249.6 m. (1,202 kcs.), 5.5 kw.

**517.2 Metres** **VIENNA** **580**  
**Power:** **20 Kw.** **(Austria)** **Kilocycles**

**Distance from London:** Approximately 760 miles.  
**Standard Time:** Central European (G.M.T. PLUS one hour).  
**Announcer:** Man. German language chiefly used.  
**Opening Signal:** Morse V ( . . . — ).  
**Interval Signal:** Fast beating metronome (about 270 beats per min).  
**Main Daily Programme:** G.M.T. 06.00, weather; 10.30, concert; 12.00, time signal, weather, then continuous broadcast almost throughout day until 16.30, concert; 18.30, main evening entertainment, concert, play, or outside relay; 20.15, news, etc.; 21.15, dance music.  
**Good-night Greetings:** "Gute Nacht, Meine Damen, Gute Nacht, meine Herren. Ich wuensche alleits recht angenehme Ruhe. Vergessen Sie nicht Ihre Antenne zu erden und die Gashaehne in Ihrer Wohnung zu schliessen" (Good night, ladies; good night, gentlemen. I wish you all a very pleasant rest. Don't forget to earth your aerial and to turn off the gas taps in your house).  
**Relays:** Vienna Experimental, 1,250 m. (240 kcs.); Klagenfurt, 153.2 m. (662 kcs.); Graz, 352.1 m. (852 kcs.); Innsbrueck, 283.5 m. (4058 kcs.); Linz, 245.9 m. (1,220 kcs.); Salzburg, 218.5 m. (1,330 kcs.).

**525 Metres** **RIGA** **572**  
**Power:** **15 Kw.** **(Latvia)** **Kilocycles**

**Distance from London:** Approximately 1,060 miles.  
**Standard Time:** Eastern European (G.M.T. PLUS two hours)  
**Announcers:** Man and woman. Announcements are frequently made in both Lettish and German.  
**Opening Signal:** Ticking of metronome (about 200 beats per minute).  
**Call (phon.):** "Halloween is Ree-ga."  
**Main Daily Programme:** G.M.T. 08.00 (Sunday), sacred service (German); 09.15 (Sunday), sacred service (Lettish); 17.30, English talk (Monday, Wednesday, and Thursday); 18.30 and 20.00, evening concerts followed by news and weather; 20.40, dance music (Saturday).  
 Some broadcasts are carried out on 200 metres.  
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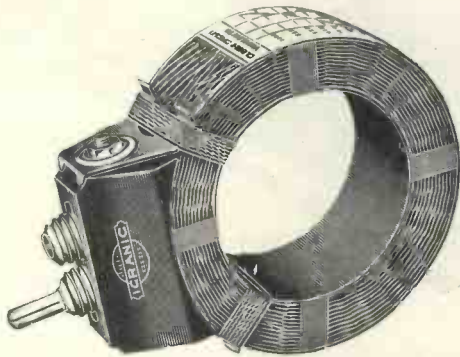
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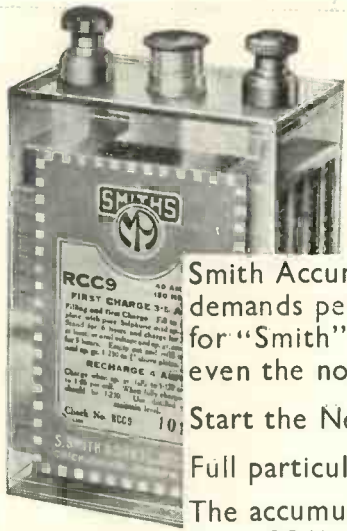
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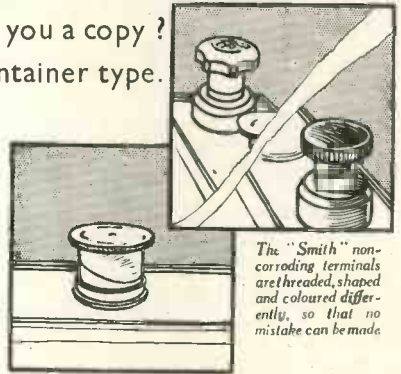
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# Broadcast Wavelengths

A special broadcast map of Europe and the wavelengths of the more important European stations will be found on pages 80 and 81 of this issue. The list below gives details of many short-wave transmitters and the less important European stations

| Wave-length | Name of Station      | Dial Readings | Country            | Wave-length | Name of Station     | Dial Readings | Country         |
|-------------|----------------------|---------------|--------------------|-------------|---------------------|---------------|-----------------|
| 14.47       | Buenos Aires LSY     |               | Argentina          | 206         | Antwerp             |               | Belgium         |
| 14.55       | Malabar PMB          |               | Java               | 215.3       | Chätelineau         |               | Belgium         |
| 15.93       | Bandoeng PLE         |               | United States      | 216         | Liège               |               | Belgium         |
| 19.56       | Schenectady W2XAD    |               | France             | 217         | Brussels Conference |               | Belgium         |
| 19.68       | Pontoise             |               | United States      | 217.5       | Königsberg          |               | Germany         |
| 19.72       | East Pittsburgh W8XK |               | Italy              | 218.7       | Flensburg           |               | Germany         |
| 19.84       | Rome (Vatican) HJV   |               | Mexico             | 219.7       | Salzburg            |               | Austria         |
| 20.5        | Chapultepec XDA      |               | Roumania           | 220.3       | Binche              |               | Belgium         |
| 21.5        | Bucharest            |               | Morocco            |             | Beziere             |               | France          |
| 23.8        | Rabat                |               | Madeira            |             | Cologne             |               | Germany         |
| 24          | Funchal CT3AQ        |               | Russia             | 227.4       | Munster             |               | Germany         |
| 25.16       | Moscow (Popoff) RW50 |               | France             | 230         | Aachen              |               | Germany         |
| 25.2        | Pontoise             |               | United States      | 232.2       | Malmö               |               | Sweden          |
| 25.25       | East Pittsburgh W8XK |               | India              | 234         | Kiel                |               | Germany         |
| 25.27       | Calcutta VUC         |               | Italy              | 235.5       | Lodz                |               | Poland          |
| 25.42       | Rome 3RO             |               | Indo-China         | 240.2       | Kristiansand        |               | Norway          |
| 25.465      | Saigon               |               | Mexico             | 240.8       | Stavanger           |               | Norway          |
| 25.5        | Chapultepec XDA      |               | Great Britain      | 244.1       | Liège               |               | Belgium         |
| 25.53       | Chelmsford 5SW       |               | Venezuela          | 244.9       | Basle               |               | Switzerland     |
| 25.6        | Caracas              |               | France             | 245.9       | Schaerbeck          |               | Belgium         |
| 25.63       | Pontoise             |               | Argentina          | 246         | Cassel              |               | Germany         |
| 26.7        | S.S. "Elettra" 1BXX  |               | Costa Rica         | 253.3       | Linz                |               | Austria         |
| 28.98       | Buenos Aires LSX     |               | Yugoslavia         | 257         | Berne               |               | Switzerland     |
| 29.3        | Heredia              |               | Argentina          | 263.8       | Gleitwitz           |               | Germany         |
| 30          | Belgrade             |               | New South Wales    | 266         | Hörby               |               | Sweden          |
| 30.57       | Buenos Aires LSOR    |               |                    | 269.8       | Mora vska-Ostrava   |               | Czecho-Slovakia |
|             | Sydney VK2ME         |               |                    | 273         | Lille               |               | France          |
| 31.28       | Melbourne VK3ME      |               | United States      | 279.3       | Bremen              |               | Germany         |
| 31.3        | Philadelphia W3XAU   |               | United States      | 280.2       | Radio Cointe        |               | Belgium         |
| 31.35       | Springfield W1XAZ    |               | Poland             | 283         | Bratislava          |               | Czecho-Slovakia |
| 31.38       | Poznan SR1           |               | Germany            | 285.2       | Brussels (SBR)      |               | Belgium         |
| 31.48       | Schenectady W2XAF    |               | Denmark            | 286         | Magdeburg           |               | Germany         |
| 31.51       | Skamleback OXY       |               | Brazil             |             | Stettin             |               | Germany         |
| 31.55       | Melbourne VK3ME      |               | Java               |             | Innsbruck           |               | Austria         |
| 31.75       | Rio de Janeiro       |               | French West Africa |             | Montpellier         |               | France          |
| 31.86       | Bandoeng PLE         |               | Morocco            |             | Swansea             |               | Great Britain   |
| 32          | Dakar                |               | United States      |             | Plymouth            |               | Great Britain   |
| 32.26       | Rabat                |               | France             |             | Aberdeen            |               | Great Britain   |
| 33          | Paris LL             |               | United States      |             | Edinburgh           |               | Great Britain   |
| 34.68       | Long Island W2XV     |               | Java               |             | Dundee              |               | Great Britain   |
| 36.92       | Bandoeng PLW         |               | Mexico             |             | Bournemouth         |               | Great Britain   |
| 39.4        | Nuevo Laredo X26A    |               | Colombia           |             | Newcastle           |               | Great Britain   |
| 39.7        | Bogota HKF           |               | Ecuador            |             | Lisbon              |               | Portugal        |
| 39.8        | Rio Bamba            |               | Germany            |             | Viipuri             |               | Finland         |
| 40          | Doberitz DOA         |               | Siam               |             | Kosice              |               | Czecho-Slovakia |
| 41          | Bangkok HSP2         |               | Las Palmas         |             | Tallinon            |               | Estonia         |
| 41.6        | Teneriffe EAR58      |               | Singapore          |             | Radio Idzerda       |               | Holland         |
| 41.7        | Singapore VS1AB      |               | Germany            |             | Falun               |               | Sweden          |
| 42.3        | Stuttgart D4XAA      |               | France             |             | Sofia (Radio Rodno) |               | Bulgaria        |
| 42.8        | Rugles F8BP          |               | Portugal           |             | Dresden             |               | Germany         |
| 42.9        | Lisbon CT1AA         |               | Spain              |             | Göteborg            |               | Sweden          |
| 43          | Madrid EAR100        |               | France             |             | Grav                |               | Austria         |
| 43.75       | Paris (Vitus)        |               | Tunis              |             | Algiers             |               | North Africa    |
| 45          | Constantine 8KR      |               | Russia             |             | Frederiksstad       |               | Norway          |
| 45.38       | Moscow               |               | United States      |             | Helsinki            |               | Finland         |
| 46.69       | Boundbrook W3XL      |               | Russia             |             | Seville             |               | Spain           |
| 47.72       | Minsk RW62           |               | Morocco            |             | Bolzano             |               | Italy           |
| 48          | Casablanca CN8MC     |               | Colombia           |             | Radio Maroc         |               | North Africa    |
| 48.05       | Baranquilla HKD      |               | Colombia           |             | Danzig              |               | Danzig          |
| 48.135      | Bogota HKC           |               | Honolulu           |             | Klagenfurt          |               | Austria         |
| 48.62       | Tegucigalpa HRB      |               | Canada             |             | Porsgrund           |               | Norway          |
| 48.8        | Winnipeg VE9CL       |               | United States      |             | Tartu               |               | Estonia         |
| 48.86       | East Pittsburgh W8XK |               | United States      |             | Leibnitz            |               | Czecho-Slovakia |
| 49.02       | Richmond Hill W2XE   |               | United States      |             | Trondheim           |               | Norway          |
| 49.05       | Saigon F31CD         |               | Canada             |             | Wilno               |               | Poland          |
| 49.18       | Boundbrook W3XAL     |               | United States      |             | Palermo             |               | Italy           |
| 49.22       | Bowmanville VE9GW    |               | South Africa       |             | Sundsvall           |               | Sweden          |
| 49.34       | Chicago W9XAA        |               | British Columbia   |             | Hanover             |               | Germany         |
| 49.4        | Johannesburg         |               | Kenya              |             | Kaiserlautern       |               | Germany         |
| 49.43       | Vancouver VE9CS      |               | United States      |             | Tampere             |               | Germany         |
| 49.5        | Nairobi 7LO          |               | United States      |             | Augsberg            |               | Finland         |
| 49.67       | New York W2XAL       |               | United States      |             | Freiburg            |               | Germany         |
| 49.83       | Chicago W9XF         |               | United States      |             | Hamar               |               | Norway          |
| 50          | Moscow RV59          |               | Russia             |             | Ostersund           |               | Sweden          |
|             | Barcelona EAJ25      |               | Spain              |             | Alma-Ata            |               | Russia          |
|             | Tananarive           |               | Madagascar         |             | Tiflis              |               | Russia          |
| 50.26       | Rome (Vatican) HJV   |               | Italy              |             | Kootwijk            |               | Holland         |
| 51.22       | Chapultepec XDA      |               | Mexico             |             | Tascherit           |               | Russia          |
| 58          | Prague OVJMP         |               | Czechoslovakia     |             | Reykjavik           |               | Iceland         |
| 62.5        | Long Island W2XV     |               | United States      |             | Vienna (testing)    |               | Austria         |
| 70.2        | Khabarovsk RV15      |               | Russia             |             | Boden               |               | Sweden          |
| 92.3        | Doberitz             |               | Germany            |             | Ankara              |               | Turkey          |
|             |                      |               |                    |             | Irkutsk             |               | Russia          |
|             |                      |               |                    |             | Norddeich           |               | Germany         |
|             |                      |               |                    |             | Sverdlovsk          |               | Russia          |
|             |                      |               |                    |             | Königswusterhausen  |               | Germany         |

# METEOR III

## The new ALL-WAVE Quality Receiver



**T**HE most interesting receiver ever designed! Possesses all the most attractive features of a modern 3-valver, plus a number of unique advantages. **SENSITIVE AND POWERFUL**—so that you may be sure of a good choice of programmes from home and abroad at excellent strength. **ADJUSTABLE SELECTIVITY**—so that each programme may be received free from interference, even under the most difficult conditions. **QUALITY**—so good that you will *really* enjoy the programmes you receive. **EASY TO TUNE**—single knob tuning with slow-motion control. **SLOW MOTION REACTION**—of wonderful advantage when tuning in distant stations. **RADIO-GRAM SWITCHING**—with connections for pick-up, *and, in addition*, **ULTRA SHORT-WAVE TUNING**, enabling you to enjoy the fascination of short-wave reception—**AMERICA, AUSTRALIA, AFRICA, THE CONTINENT, ETC.**

*No need for the expense and inconvenience of a separate short-wave set—build a Meteor and you have a receiver which covers ALL wavelengths, with single dial tuning.*

**FREE—**

**FULL SIZE 1/- PLAN**  
Complete building instructions. Go to your radio dealer. Ask him for your **FREE** copy of the Meteor Folder. Read all about this fascinating **ALL-WAVE ALL-PURPOSE** Receiver. See how easy it is to build. We are distributing 100,000 Meteor Folders **FREE**. If your dealer is out of stock, post coupon now.

**THE EASIEST SET TO BUILD.** The full-size Meteor Folder will prove to you how easily and quickly the Meteor can be built. No cutting or drilling—the polished panel is already cut and drilled. No soldering—Jiffilinx of correct lengths are supplied ready to drop into position. A screw-driver and pliers are the only tools you need.



**EQUAL IN APPEARANCE TO A 15 GUINEA MODEL**  
**METEOR III KIT**

Full set of components with polished panel (cut and drilled), baseboard, Jiffilinx, screws, etc.

**PRICE 75/- OR**

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**METEOR STANDARD CABINET MODEL**

Kit as above with Standard Cabinet.

**PRICE 89/6 OR**

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Kit as above with Consolette Cabinet, as illustrated.

**PRICE £5.0.0 OR**

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**G. P. KENDALL, B.Sc., designed the Meteor III. His name alone is sufficient guarantee that the Meteor is a "Super" receiver in all except price.**

**To: READY RADIO LTD., EASTNOR HOUSE, BLACKHEATH, S.E.3.**

Please send me Meteor III Folder—FREE.

Name \_\_\_\_\_

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Ready Radio Ltd., Eastnor House, Blackheath, S.E.3  
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# SELLING IN THOUSANDS

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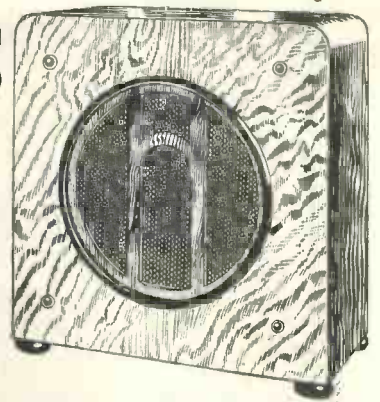
Used in every laboratory in the country.

Diameter 2 in.

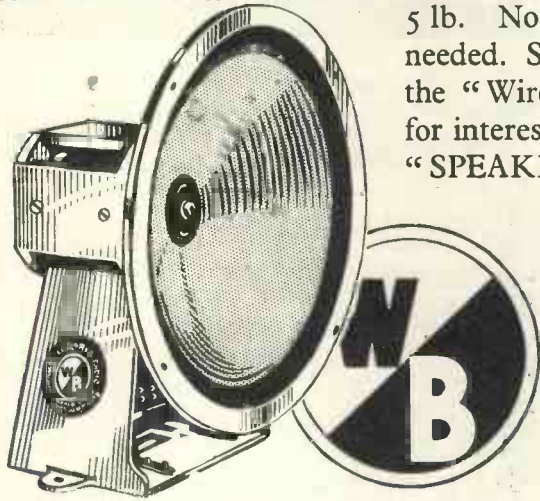
Price 10d.

Because the price is half its value. This astonishing speaker gives true moving-coil reproduction from any 2-, 3- or multi-valve set—a performance equalled only by much higher-priced instruments. The Sheffield-made cobalt steel magnet weighs 5 lb. No mains or batteries are needed. Strongly recommended by the "Wireless Magazine." Write for interesting art booklet "SPEAKING OF SPEAKERS"

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Handsome grained Oak Cabinet to suit the P.M.3 (or similar size of speaker) - - 30/-



## PERMANENT MAGNET MOVING COIL SPEAKER

PM3  
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Made by the makers of the famous W.B. Valveholders and Switches

Three-ratio output transformer 7/6 extra

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### "CLARION" AGAIN CHOSEN!

This time for the "last word" in "Straight Four" Receivers.

### THE "QUADRADYNE"



A choice OAK Cabinet. French Polished or Dull Wax finish, with Panel ready drilled.

Price 27/6

Carriage Paid

Baseboard made up, complete ready for mounting all components, 3/6 extra.

### "CLARION 1932 SUPER 60" CABINET

All builders of this outstanding set designed by W. JAMES, should place their order now. See our "Offer" on Page 639 of January issue

"Clarion" Radio Furniture includes Cabinets and Cases for every type of Radio apparatus. Booklet "W" Free

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### THE BEST "ALWAYS"

## for the "New Plug-in Coil Three"

The British General Transformer specified for the circuit described in this issue, is an outstanding example of efficiency allied to low price. It definitely improves reception and prevents the damage due to the sudden switching on and off of relatively large currents. Multi-ratio. Price

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From all Dealers or direct from the Manufacturers

BRITISH GENERAL MANUFACTURING CO. LTD. Brockley Works, London, S.E.1



## BRITISH GENERAL OUTPUT TRANSFORMER

When you send your order don't forget to say you "saw it in the W.M."



# SIEMENS FULL O'POWER RADIO BATTERIES

*Maintain Full Power throughout*



REA

From  
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From Hull, Yorks. :-

"I would like you to know that your H 2 Battery has given 50% better and longer service than any of 6 or 7 makes I have tried before."

*As used by the B.B.C.*

Dept. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED. 38/9, Upper Thames Street, London, E.C.4.

## SPECIFIED FOR THE "QUADRADYNE"

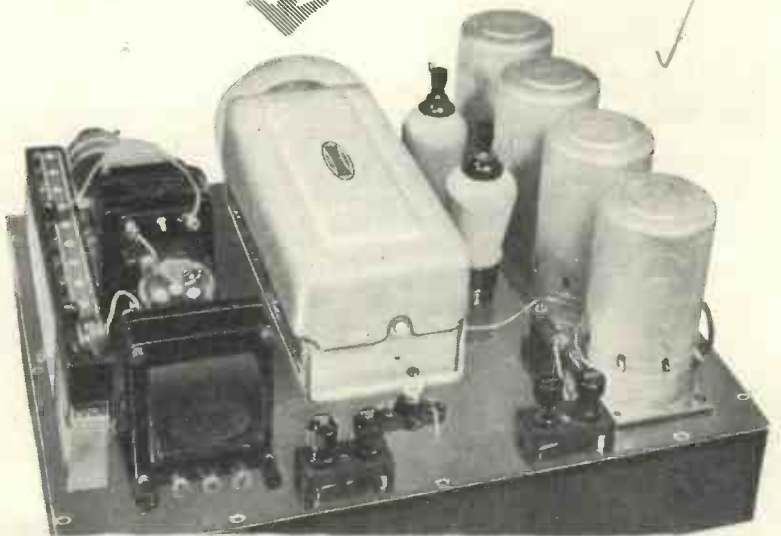
The British Radiophone Ganged Condensers are specially designed to meet the requirements of modern circuits demanding very high selectivity, smooth action and perfect ganging. For these reasons, the British Radiophone four-gang condenser has been specified in the wonderful "Quadradyne"—the latest triumph of the WIRELESS MAGAZINE.

**Accuracy is guaranteed to within half of one per cent!**

|  |      |
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| Four-gang Condenser ... ..   | 38/- |
| Dustproof Metal Cover ... ..   | 4/-  |
| Oxidised Silver Escutcheon and Drive Assembly complete with pilot lamp attachment ... .. | 5/-  |

*Also made in 2 and 3 Gangs*

*Write for completely illustrated descriptive brochure.*



## RADIOPHONE GANGED CONDENSER

THE BRITISH RADIOPHONE LTD., Aldwych House, Aldwych, London, W.C.2

Telephone: HOLBORN 6744

*Advertisers like to know you "saw it in the 'Wireless Magazine'"*

# In Tune with the Trade

FETTER LANE'S Review of Catalogues and Pamphlets

ments. What I do like to see, though, are handy control knobs, sturdy switches and indicated terminals of a sensible size.

This last detail, unfortunately, is the one on which too many set builders "gang a-gley." Having built a fine set, they think that any old bit of twisted flex suffices for a battery connection. Well, maybe it works, but you see for yourself how much more convenient it is to have good terminals, at least for aerial, earth and loud-speaker, if not for the batteries.

If you are in doubt as to types, write for a free copy of the new Belling-Lee booklet on terminals and wander plugs.

241

## H.T. FROM ACCUMULATORS

THERE is really a great deal to be said for high-tension accumulators, although the greater popularity of mains kits, with those fortunates who have a mains supply, is now overshadowing what was once considered to be the only satisfactory high-tension source.

It is perhaps not without interest that the B.B.C. uses high-tension accumulators when amplifiers are used out of doors and away from studio lines.

The new C.A.V. folder, No. 80, describes a very handy 10-volt high-tension unit, model G103. These 10-volt units can be obtained in 60-volt groups in oak crates. Any number of units may, of course, be placed in series.

Where you are not too far from a charging station and when a fairly large set is being operated, so that the high-tension consumption demands something more than a small-capacity dry battery, then you will find high-tension accumulators a practical proposition.

242

## MAGNUM MAINS SETS

PERIODICALLY, Burne Jones and Co., Ltd., send me handy booklets about new lines. A special folder dealing with A.C. sets has just come to hand. The *pièce de résistance* (that's what comes of listening to Radio Paris!) is the A.C. Band-pass Three. It incorporates a straightforward three-circuit band-pass tuner and a pentode is used in the output stage.

The set is available in various forms and it looks particularly attractive on a small pedestal. An A.C. Stenode is also made by Magnum. This is a mains-driven seven-valve super-het operating on the Stenode principle.

I should perhaps add, in connection with the Band-pass Three, that a battery model is also available, fitted with a balanced-armature loud-speaker in place of the moving-coil job in the mains-driven outfit.

243

## CHOOSING A SPEAKER UNIT

AS I have just been going through a number of catalogues to choose a new loud-speaker unit for a friend of mine

I speak feelingly about the comprehensive details given in the Blue Spot folder. After all said and done, grandiose phrases such as "remarkable purity of reproduction" and "perfect response to every note" don't mean very much when it comes to actualities.

What I want to know when getting the unit was the impedance-matching arrangements and maximum input permissible. Blue Spot's do not hide these facts behind advertising slogans. One of the most striking reproducers in the range is the new permanent-magnet job. It has what I think must be one of the largest rim-magnets on the market.

The 100-U inductor type loud-speaker is also out of the ordinary. This, by the way, requires no matching transformer, even when it is used by a pentode.

244

## HAVE YOU TRIED ELECTROLYTICS?

THESE new electrolytic condensers seem to have many uses. One can squeeze so many microfarads into a small space with the electrolytic principle. I confess to being surprised at the comparatively low cost of some of these new condensers.

I have just been looking through a T.C.C. folder. T.C.C. make two varieties of electrolytic condensers, the dry and aqueous types. The latter have a smaller capacity of only 8 and 10 microfarads, but operate at a working voltage of 460 volts.

The dry condensers generally have a lower maximum working voltage. Three dry types are available for 12, 40 and 100 volts. These condensers can, of course, only be used on D.C. mains.

You should get this new T.C.C. folder. It describes the paper and mica dielectrics as well.

245

## THE NEW "ALL-METAL WAY"

This booklet is not available under the free "Wireless Magazine" service: 3d. in stamps must be sent direct to the Westinghouse Brake and Saxby Signal Co., Ltd.

THE *All-Metal Way* for 1932 has just arrived on my desk. If you are a keen mains user you will, in all probability, have had a copy of this in preceding years. A hint will be all you will need to write for the new issue.

If you have not met it before then let me tell you that it is one of the handiest little publications on metal rectifiers that I have seen. It is definitely not a catalogue. Its 36 pages are devoted to hints, tips and practical circuits for high-tension, low-tension and grid bias from the mains. An inserted sheet in the book gives prices of the various models.

I can confidently recommend the 1932 *All-Metal Way* to any mains user who likes to build his own apparatus or wants to make improvements to an existing high-tension unit.

## COLUMBIA SETS

A GOOD many readers like to keep up to date with set manufacturers' publications and to these I recommend the new Columbia literature. The new transportable and console sets are described in a very nicely got up catalogue, a copy of which has just been sent me.

Mains users are particularly well catered for, and the new mains transportable seems to me to be a thoroughly sound job. Unfortunately, there is not space here to detail the technical specification of each model.

Take my tip and drop a line, through my free catalogue service, for the new Columbia booklet.

239

## RENEWING YOUR BATTERY

UNLESS you were wise enough at the beginning of the year to check over the high-tension and grid-bias batteries you will probably, by now, be finding the need for replacements. One of the handiest things in this line is the new Pertrix folder. It gives in concentrated form dimensions and capacity details of every type of Pertrix battery.

It is by now a well-known fact that the chemical action in a Pertrix battery is different from that in an ordinary Leclanche-type cell and the recuperative properties are certainly remarkable.

Technical information on this point is given in the Pertrix literature, so there is no need for me to labour it here. What I do want to stress is the convenient arrangement of the new battery folder which makes it so easy to choose the right type.

240

## THE DETAIL POINTS

A THING that always impresses me about an amateur set is the way in which it is finished off. I don't mean only as regards wiring, for I confess to a permanent inability to make good soldered joints and neat lead arrange-

# A DISTINGUISHED PERFORMER

**Read these Press extracts—**

All the time one is using the controls, one has the feeling that a superheterodyne is being used, so prolific is it as a station getter...

We were impressed by the very high quality and finish and soundness of workmanship throughout. The set is of the highest quality...

Speech and piano tone are particularly good; the latter is round and full . . . . .

The receiver was sufficiently sensitive for a small picture rail aerial to suffice for a wide range of reception . . . . .



Model 352

# 23

GUINEAS

OR

# 48/-

# DOWN

and twelve monthly payments of 39/- One knob tunes three ganged condensers. No reaction. Volume control also acts as the "off" switch. Coil excited speaker in Walnut Cabinet. A.C. or D.C. Mains

All-British

# Columbia

LONG DISTANCE

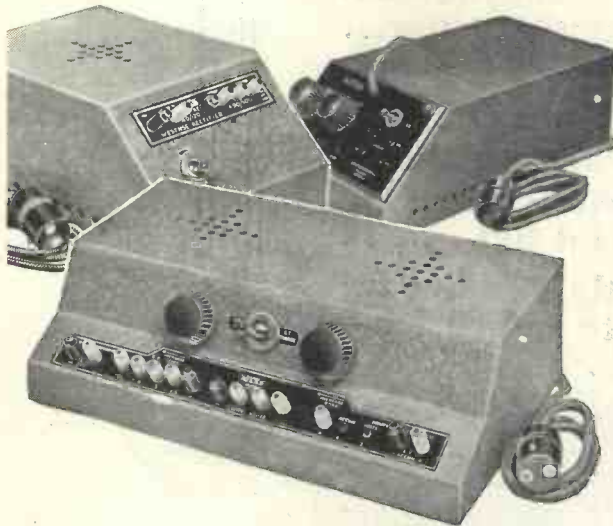
# RADIO

### FREE TRIAL

A postcard to Columbia, 101, Clerkenwell Road, London, E.C.1 will arrange a demonstration free and without obligation in your own home.

*Advertisers like to know you " saw it in the ' Wireless Magazine ' "*

*"no better way to*  
**ALL-MAINS RADIO**



THERE'S now no need to scrap your battery-driven receiver in favour of a new and expensive all-mains model. You can enjoy absolute reliability, increased power, and economy, and put an end to battery troubles for ever by converting your old set to mains operation. Get an "ATLAS" All-British Mains Unit. Nothing could be easier to install, nothing simpler or more reliable in operation and it will cut your running cost to only one penny a week. Ask your dealer to demonstrate, and be sure to insist on "ATLAS," the winners of the *Wireless World* Olympia Ballot in 1930 and 1931. There are "ATLAS" Units for every requirement: D.C. models from 35/3, A.C. models from 52/6. Send coupon for your free copy of "Power from the Mains," giving many valuable hints on converting battery sets to mains operation.

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THE BEST receiver is only as good as its speaker. The Best Speaker has the name of Edison Bell behind it. Therefore, the Best Wireless Receiving-Set is that equipped with one of

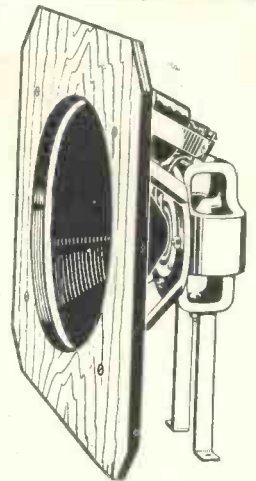
The new  
**EDISON BELL**  
Permanent Magnet  
Moving Coil  
Models

universally admitted by Trade, Press and Public to be EASILY FIRST.

Says the  
**WIRELESS RETAILERS ASSOCN.**

"At the Radio Eisteddfod held in Bristol your Permanent Magnet Moving-Coil Speaker was placed first by popular vote."

Two types are available—Power or Pentode (as illustrated) or in walnut cabinet. Model 456 with tapped transformer to which the connections may be adjusted in order to match various power-valves, and Model 456a fitted with transformer suitable for use with Pentode and small power-valves.



WHEN ITS BEST BUY BRITISH  
**EDISON BELL IS BOTH**

Prices :  
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**Build your eliminator  
with a metal rectifier**

Ever since Metal Rectifiers for home-constructors' use were first introduced, they have increased steadily in popularity; and there are many reasons for this. They are remarkably easy to use—the circuits\* are simpler than for any other kind. A less expensive transformer may be used with the metal rectifier than that required for other types. And—most important—they are very economical, as they do not burn out or deteriorate (rigorous tests made in this connection with units which have been in continuous service for over five years reveal no falling-off in output). \*"The All Metal Way" contains a great deal of information concerning the operation of radio sets from A.C. mains. It gives full details of how to use the various types of Westinghouse Metal Rectifiers, together with tested circuits. The booklet will be sent to you if you forward the coupon with threepence in stamps.

**WESTINGHOUSE**  
**METAL RECTIFIERS**

The Westinghouse Brake & Saxby Signal Co. Ltd.,  
82 York Rd., King's Cross London. Phone: North 2415.

**COUPON**

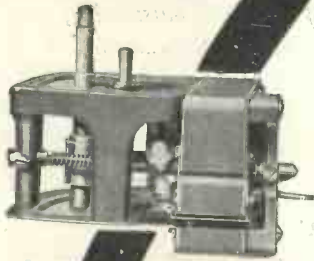
WESTINGHOUSE PUBLICITY, 82 York Road, King's Cross, London, N.1. Please send me your booklet, "The All Metal Way," for which I enclose 3d. in stamps.

PLEASE WRITE IN BLOCK LETTERS.

Name.....  
Address.....

W.M. 232

**MAKE SURE OF COMPLETE SATISFACTION BY FITTING YOUR RADIOGRAMPHONE WITH THE PAILLARD INDUCTION MOTOR**



4 1/2" x 3 1/4" x 2 1/2"

The new Paillard Junior 2-pole asynchronous Induction Motor is made on an entirely new principle (patent applications pending). It gives a perfectly smooth drive without any kind of interference, and has an ample margin of power to play the heaviest recordings. Current consumption about 13 watts. No. 1501 for 100-130 v. No. 1503 for 200-250 v.

Price, complete with 12" Turntable, and combined brake and switch:  
With Automatic Brake

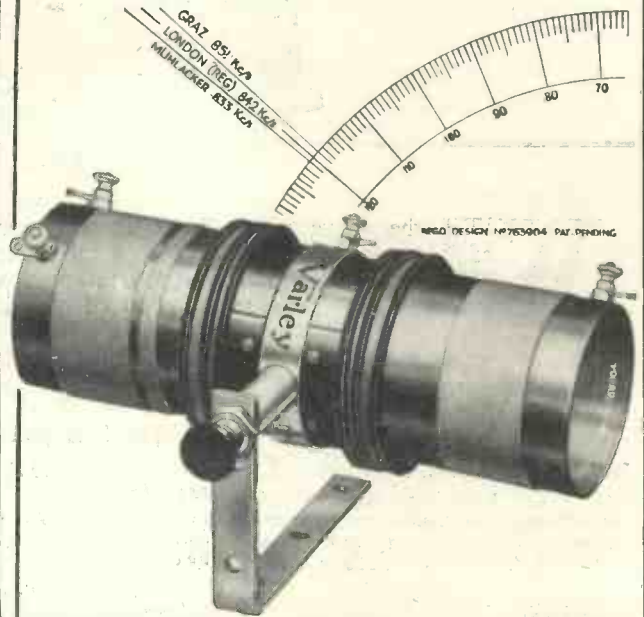
**NEW 47'6 PAILLARD JUNIOR ELECTRIC INDUCTION MOTOR**

HIRE PURCHASE TERMS, Junior motors with automatic brake 5s. 3d. deposit and 11 monthly payments of 4s. 3d.

APOLLOGRAMPHONE CO. LTD. (Dept. W.M.)  
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Fully illustrated price lists on application.

**" WIRELESS MAGAZINE "**

says:— "Prolonged tests have proved beyond doubt the good qualities of the Varley band-pass aerial coil . . . cuts off interfering stations in a surprising manner."



**SQUARE PEAK**

Regd. Trade Mark

**COIL 15/-**

Why not give your receiver the wonderful improvement of "Square Peak" band-pass tuning?

The Varley "Square Peak" Coils are recommended by AMATEUR WIRELESS, MODERN WIRELESS, POPULAR WIRELESS, WIRELESS CONSTRUCTOR, WIRELESS MAGAZINE and WIRELESS WORLD, and used in their Star Circuits and Exhibition Sets.

"Gives amazing selectivity . . . is fine for distance-getting . . . no interference from local stations."—AMATEUR WIRELESS.

"The best commercial wave-change coil unit that has yet been produced."—POPULAR WIRELESS.

"With the Varley Coil there is substantially a square-peak resonant curve 9 kilocycles in width."—WIRELESS CONSTRUCTOR.

For circuit diagrams showing how to build a "Square Peak" Set write for colour leaflet and for circuit folder Z.



Advertisement of Oliver Pell Control Ltd., Kingsway House, 103 Kingsway, London, W.C.2. Telephone: Holborn 5303.



"We're Fluxite and Solder, the reliable pair,

Famous for Soldering — known everywhere!

We SOLDER all 'connections'; it doesn't take long, Then sit back and listen to music and song!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy, soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do. All Hardware and Ironmongery ANOTHER USE FOR FLUXITE Stores sell Fluxite in tins, 8d., 1/4 and 2/8. Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

**NEW "JUNIOR" SIZE, 4d. per tin FLUXITE SOLDERING SET**

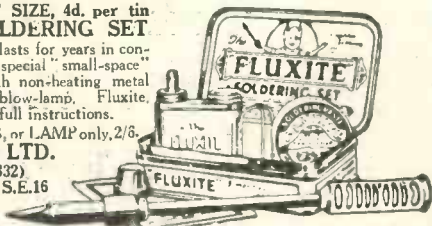
Simple to use and lasts for years in constant use. Contains special "small-space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite. Solder, etc.: and full instructions.

COMPLETE 7/6, or LAMP only, 2/6.

FLUXITE, LTD.

(Dept. 332)

ROTHERHAM, S.E.16

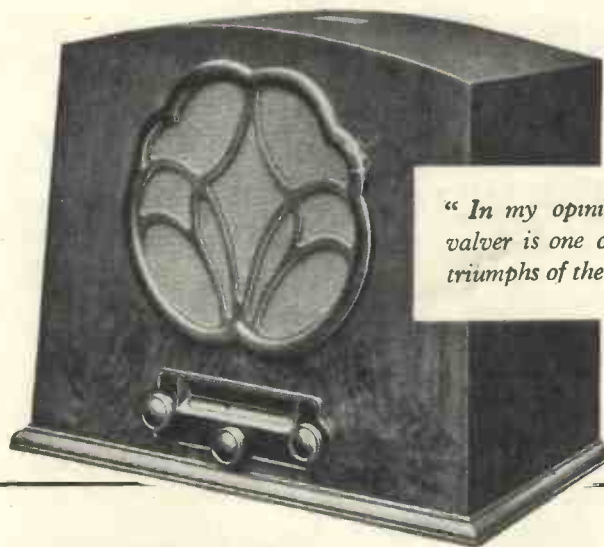


ALL MECHANICS WILL HAVE

**FLUXITE**

IT SIMPLIFIES ALL SOLDERING

Speedy replies result from mentioning "Wireless Magazine"



"In my opinion the H.M.V. three-valver is one of the most outstanding triumphs of the British radio industry."

**W**ITH the above words "Set Tester" concludes the review in the December 26th issue of "Amateur Wireless" of a receiver that is already making 1932 radio history—the "His Master's Voice" Model 435 three-valve all-mains radio set with self-contained moving-coil loudspeaker. Turn to page 40 of this issue and read "Wireless Magazine's" opinion.

## ARE YOU CURIOUS?

Here are a few answers to questions you might ask about this wonder receiver—

**QUESTION.** What is this Instrument?

**ANSWER.** A straight radio-set which can reproduce records electrically by connecting a pick-up or record player such as the "H.M.V." models 11, 116 or 117.

**QUESTION.** How many valves are used in this set?

**ANSWER.** Four in the A.C. instrument, including the rectifier, and three in the D.C. instrument.

**QUESTION.** On what voltages will this instrument operate?

**ANSWER.** Separate models are made for A.C. or D.C. The A.C. voltage range is:—95-164, 190-260 volts, 50-100 cycles. D.C. model—190-250 volts.

**QUESTION.** Are there any batteries used in the 435?

**ANSWER.** None at all; the instrument is completely mains operated.

**QUESTION.** Is this set easy to tune?

**ANSWER.** One dial tuning is employed and the scales calibrated in wave-lengths.

**QUESTION.** Does that mean there is more than one scale?

**ANSWER.** Yes; this instrument has an ingenious feature whereby the switch that changes the wavelength ranges automatically presents new scales reading as follows: "Medium Wave," "Long Wave," "Gramophone" and "Off."

**QUESTION.** Are the wavelengths easy to read?

**ANSWER.** Very: the pointer moves horizontally, and the dials are illuminated by concealed lighting.

**QUESTION.** Is it possible to control the volume of the output from the radio?

**ANSWER.** One volume control is conveniently situated on the front of the instrument and enables either radio or gramophone music to be regulated with a fine degree of accuracy.

**QUESTION.** How does the quality of reproduction from this set compare with other radio-receivers?

**ANSWER.** By reason of the special band-pass tuning circuits whereby distortion during tuning of radio signals is eliminated, extremely good reproduction is obtained.

**QUESTION.** Is it necessary to attach a loud-speaker to the set?

**ANSWER.** A permanent magnet moving coil loud-speaker is built in the cabinet of the instrument.

**QUESTION.** Is it possible to receive any signals without an aerial?

**ANSWER.** A mains aerial device is fitted to the A.C. instrument which enables the principal Continental stations to be received without the necessity of erecting an aerial. In the case of the D.C. model similar results may be obtained by a few feet of flex run round the picture rail.

**QUESTION.** Can this set be taken from room to room without difficulty?

**ANSWER.** As it is a self-contained unit there is no reason why the receiver should not be taken from one room to another as desired.

**QUESTION.** What is the arrangement of the valves in the 435?

**ANSWER.** There is a screened-grid high frequency stage, a detector valve employing power grid rectification which is coupled to a super-power pentode by a 7 to 1 transformer of special design.

**QUESTION.** What is the output of the receiver?

**ANSWER.** 1½ watts undistorted, which is ample volume for the average room.

**QUESTION.** What are the wave-lengths ranges of this set?

**ANSWER.** 220-550 metres; 800-2200 metres.

**QUESTION.** Can extra loudspeakers be operated by the 435?

**ANSWER.** Up to two moving coil loudspeakers of low resistance type may be connected to this receiver—for instance, the "H.M.V." models L.S. 5 or L.S. 7.

**QUESTION.** What type of cabinet is the radio-set housed in?

**ANSWER.** An arched walnut cabinet of pleasing design.

**QUESTION.** What is the price of the "His Master's Voice" Model 435?

**ANSWER.** Cash Price 22 guineas, or 46/2 down and 12 monthly payments of 37/3.

THE FIRST WIRELESS SET TO QUALIFY FOR THE WORLD'S MOST FAMOUS TRADE MARK

# His Master's Voice



The Gramophone Co. Ltd., London, W.1.

There is news in the "Wireless Magazine" advertisements

# The QUADRADYNE



## WHAT IT IS

Here are full constructional details for making a four-valve set with two screen-grid stages and four tuned circuits—but there is only one tuning knob to manipulate.

During a three-hour test no fewer than forty-five stations were received at good strength—ample proof of the high degree of selectivity and sensitivity given by the Quadradyne.

The "Wireless Magazine" Technical Staff is proud of this design—and so will you be if you build it up!

## THE LAST WORD IN "STRAIGHT" FOURS

HERE is a design for a four-valve "straight" set with which readers of "Wireless Magazine" can start the New Year really well. It has been specially produced by the "Wireless Magazine" Technical Staff and is in every sense the last word in modern technique.

### Four Tuned Circuits

There are four valves and four tuned circuits. Two of the valves are of the screen-grid type and therefore the Quadradyne can be relied upon to give really good sensitivity. Of the four tuned circuits, two comprise the band-pass aerial input and the other two are tuned-grid circuits associated with the high-frequency valves.

This combination of valves and tuned circuits means that the set has better sensitivity and selectivity than any other "straight" arrangement using the same number of valves. The capabilities of the Quadradyne are well illustrated by the test report that appears on page 27: this shows that forty-five stations were received at good strength during a three-hour test.

There are so many

special features in the Quadradyne that it is difficult to know to which to draw the reader's attention first.

Perhaps the outstanding feature is the fact that *only one knob has to be adjusted to tune all four circuits*. For this purpose a four-gang condenser is used. Once the preliminary adjustments have been made to the small trimming condensers on this there is only the one control to operate to bring in literally scores of stations from all over Europe.

The importance of electrical reproduction of gramophone records is

now recognised by everybody and for that reason *provision is made in the Quadradyne for the use of a pick-up*. This can be kept permanently connected to the set and is brought into use when required by the movement of a single switch.

### Volume and Quality

Besides the two screen-grid high-frequency valves there is a power-grid detector and a pentode output valve. *These ensure maximum volume and good quality of reproduction*, for the pentode, which is normally inclined to give slightly high-pitched reproduction, is provided with a tone compensator that can be controlled from the front of the set. *Thus the "balance" of reproduction, either for radio or gramophone work, can be adjusted to suit the individual listener's preferences.*

A special form of base-board-chassis construction has been adopted for the Quadradyne. This has most of the advantages of an all-metal chassis assembly, but is very much easier for the constructor to tackle. The clean appearance that results from this method of assem-



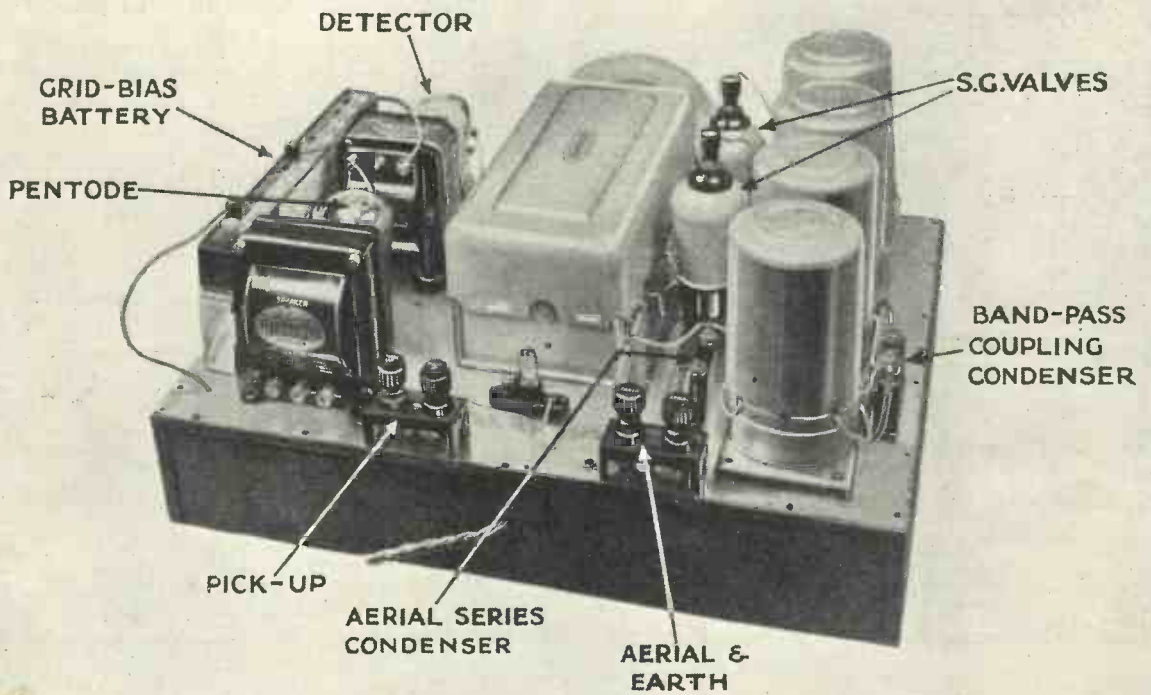
### FOUR TUNED CIRCUITS FOR SELECTIVITY

This view of the Quadradyne shows clearly the four-gang condenser and the four dual-range coils which give a very high degree of selectivity

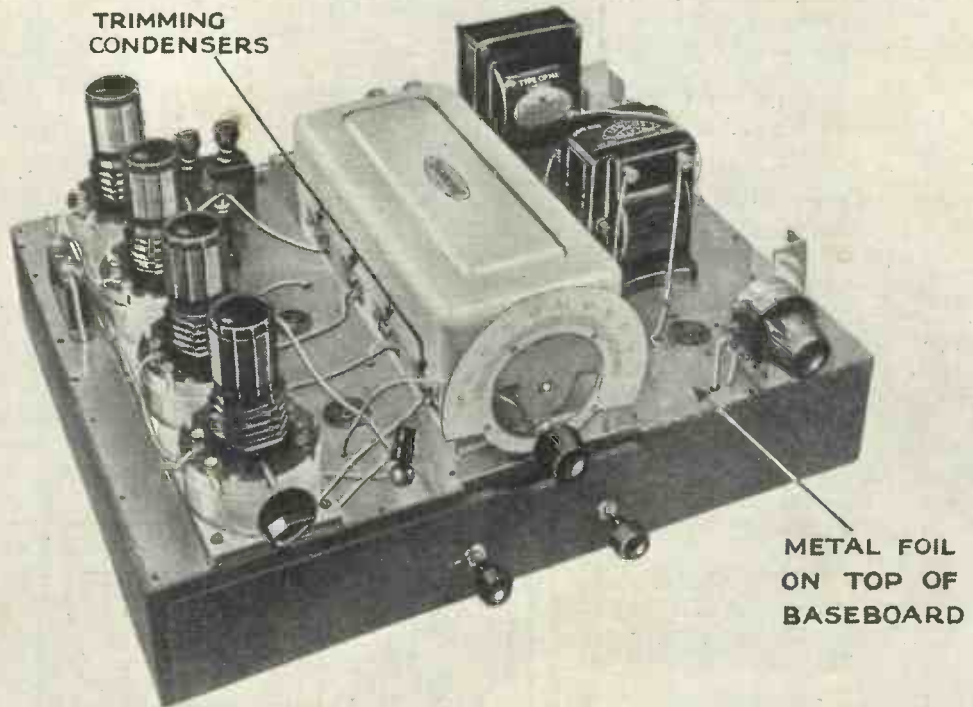




*A Good Set That Looks Good!*



*Top of the set, with valves in position, seen from the back*

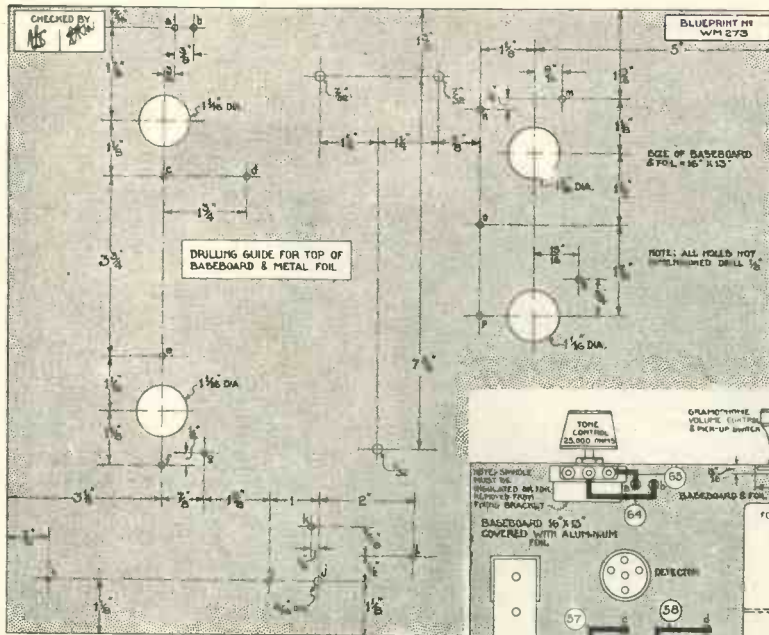


*Showing the four coils with screening cans removed, they are all of the dual-range type*

# THE QUADRAYDNE Continued

Blueprint Dept., 58-61 Fetter Lane, London, E.C.4, and ask for No. WM273. A copy will be sent by return of post.

The blueprint (and the quarter-scale layout and wiring diagram reproduced on this page) is divided into three parts. There is a plan view of the top of the baseboard,



### QUARTER-SCALE LAYOUT AND WIRING DIAGRAMS

Above is a drilling guide for the top of the baseboard, which is covered with aluminum foil. At the right are the wiring guides for the top and under sides of the baseboard. All of these can be obtained as a full-size blueprint for half price, that is, 9d., post free, if the coupon on the last page of this issue is used by February 29. Ask for No. WM273

developed on the right lines and this opinion will be confirmed when the details of construction are taken into consideration. The screening of the set is very complete and there is no chance of instability giving rise to any trouble when the set is in operation. Indeed, this design is one of the best the "Wireless Magazine" Technical Staff has yet evolved.

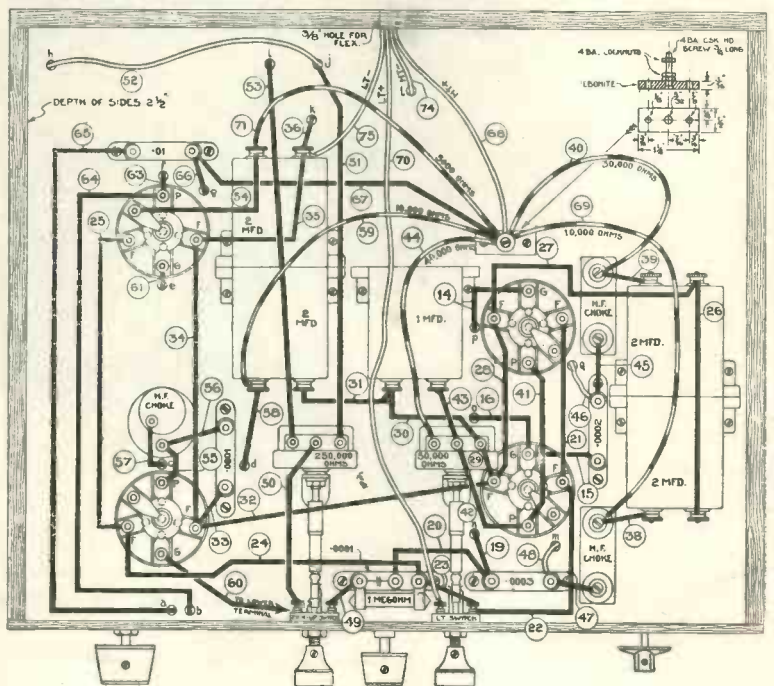
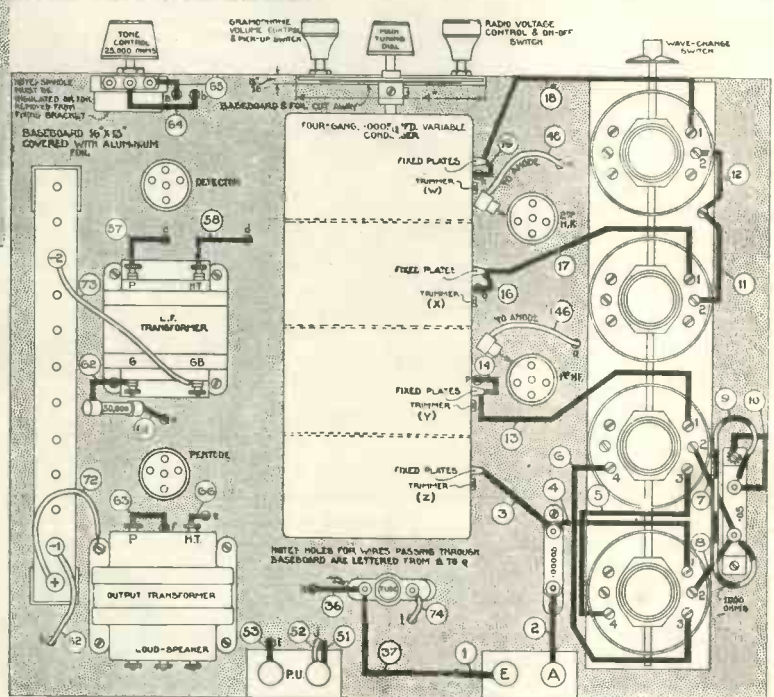
### Points in Construction

It will be clear from the photographs that appear in these pages that there are great advantages in using a baseboard covered with metal foil and placing many of the components underneath it. Very complete screening of the high-frequency circuits is obtained in this way and the wiring is not unduly complicated.

It is easy to drill holes through the thin metal foil and the wood baseboard, and constructors will have little difficulty in making the alterations necessary for using alternative parts if desired.

All the essential details for the construction of the Quadraydne are included in these pages, but readers are advised to make use of a "Wireless Magazine" full-size blueprint.

One of these can be obtained for half price, that is, 9d., post free, if the coupon on the last page of this issue is used by February 29. Address your application to "Wireless Magazine"



# A ONE-KNOB SET WITH TWO S.G. STAGES

showing the positions and wiring of the upper components. Below this is a plan of the underside of the baseboard, with the positions and wiring of the under-baseboard parts.

The top part of the blueprint is a drilling guide for the top of the baseboard. The positions and sizes of the holes shown will be suitable only, of course, for the particular components used in the original set. For this reason no alternatives are given in the list of parts needed for the construction of the set.

## Standard Parts

This does not mean that the circuit is so critical that no standard parts can be used in place of those employed in the original model: whatever alternatives were recommended, it would mean that alterations would have to be made in the drilling of the baseboard.

As far as possible, constructors should follow the "Wireless Magazine" specification exactly, but where a number of suitable parts are already on hand they can be used if the necessary drilling alterations are made before the baseboard assembly is completed.

The first part of the construction is to tack to the baseboard a sheet of aluminium or copper foil: this should be of No. 32 or 34 gauge. The top-part of the blueprint should then be placed squarely over this and held in position by means of a few more tacks or drawing pins.

## Alternative Components

Then, provided that the components to be used are all the same as in the original model, the necessary drilling holes should be marked out. If alternative parts are to be used the necessary holes should be marked out as nearly as possible in the positions indicated for the specified parts.

When all the holes have been drilled the parts can be fixed to the top of the baseboard. There is no special point to be noted about this, except as regards the fixing of the four-gang condenser. This is held in position by means of three screws. These are screwed from the underside of the baseboard and go into three tapped holes in the bottom of the condenser framework. The makers supply the necessary screws and a drilling template: the positions

## TEST REPORT on the QUADRADYNE

**M**Y first favourable impression of the Quadradyne was obtained before I had the set working. I liked its general appearance, neatness of controls and, above all, the fact there was only one knob to turn.

The test was carried out in South London—about twenty miles from the London twin transmitters—using an outdoor aerial 75 ft. long.

After the set had been working for a few minutes, I was pleased to notice the wide ranges covered on both the medium and long wavebands. As will be seen from the station log, Wilno (581 metres) at 97 degrees and Konigsberg (217 metres) at 1 degree represented the wide range available on the medium waves.

On the long waveband Kaunas (1,935 metres) at 85 degrees and Leningrad (1,000 metres) at 11 degrees demonstrate a similar good feature. It will be seen, therefore, that the wave-lengths of all the worth-while stations are covered by this set.

The stations listed in my log were received during a three-hour test on the evening of January 2. It will be noticed that a few familiar foreigners are missing. On the other hand, several seldom-heard foreign stations, mostly of low power, are included. I do not remember receiving Dublin—it can hardly be called a foreign station—at such good strength before.

### Easy to Handle

The set is very easy to handle, even in the hands of an inexperienced beginner. Quality I can best describe as being very pleasant, crisp, and natural.

Nearly all pairs of adjacent high-power stations, such as Rome and Stockholm, could be separated to allow good reception of either station. Toulouse and Lvov were heard at pleasant strength

quite clear of London Regional. London National spread only three degrees on the dial and caused little interference to neighbouring stations.

### Selective Properties

The selective properties of the set were tried to the uttermost in the separation of the three high-power stations, Langenberg, North Regional, and Prague. All of these stations are working on a power of over 50 kilowatts yet they have only the bare 9-kilocycle separation between them. It was not possible to get North Regional clear, but the interference was negligible. No interference was noticed on Langenberg and Prague could be clearly received.

On the long waves the selective properties of the set were adequate. All the stations mentioned in the log were separated with the exception of Konigs-wusterhausen. In this case the background of Daventry National was very small and did not materially affect the reception of the German station.

Out of the forty-five stations received during my three-hour test, more than thirty could be relied upon to give interference-free entertainment. Do not expect to get Leningrad (1,000 metres) on the long waves, free from interference. All the coast wireless beacons are working on this wavelength and this station's speech is difficult to hear.

I was very surprised by the set's capabilities in picking-up foreign stations during daylight. On a Sunday morning I heard twelve foreign stations working on the medium waves. Of these Langenberg, Brussels and Huizen were received at night-time strength.

On the long waves eight stations were heard at full loud-speaker strength. This set has an almost 100 per cent. entertainment value on this waveband.

### MEDIUM-WAVE STATIONS

| Wave-length | Station         | Dial Reading | Wave-length | Station          | Dial Reading |
|-------------|-----------------|--------------|-------------|------------------|--------------|
| 217         | Konigsberg      | 1            | 381         | Lvov             | 46           |
| 227         | Cologne         | 3            | 385         | Toulouse         | 47           |
| 239         | Nurnberg        | 6            | 398.9       | Midland Regional | 51           |
| 247.7       | Trieste         | 8            | 403         | Sottens          | 52           |
| 259         | Leipzig         | 10           | 413         | Dublin           | 55           |
| 261.6       | London National | 11½          | 418         | Berlin           | 57           |
| 274.4       | Turin           | 15           | 436         | Stockholm        | 61           |
| 276.5       | Heilsberg       | 16½          | 441         | Rome             | 63           |
| 279         | Bratislava      | 17½          | 459         | Beromuenster     | 67           |
| 298.8       | Huizen          | 22           | 473         | Langenberg       | 70           |
| 301.5       | North Regional  | 23           | 480         | North Regional!  | 72           |
| 322         | Goteborg        | 29           | 488.6       | Prague           | 74           |
| 338.2       | Brussels No. 2  | 33           | 509         | Brussels No. 1   | 80           |
| 345         | Strasbourg      | 35           | 517         | Vienna           | 82½          |
| 349         | Barcelona       | 36           | 550         | Budapest         | 91           |
| 356.3       | London Regional | 40           | 581         | Wilno            | 97           |
| 360.5       | Muhlacker       | 42           |             |                  |              |

### LONG-WAVE STATIONS

| Wave-length | Station                | Dial Reading | Wave-length | Station            | Dial Reading |
|-------------|------------------------|--------------|-------------|--------------------|--------------|
| 1,000       | Leningrad              | 11           | 1,445.7     | Eiffel Tower       | 50           |
| 1,083       | Oslo                   | 20           | 1,554.4     | Daventry National  | 57           |
| 1,153       | Kalundborg             | 25           | 1,635       | Konigswusterhausen | 65           |
| 1,304       | Moscow (Trades Unions) | 37           | 1,725       | Radio Paris        | 70           |
| 1,348       | Motala                 | 41           | 1,875       | Hilversum          | 80           |
| 1,411       | Warsaw                 | 46           | 1,935       | Kaunas             | 85           |

# THE QUADRADYNE—Continued

of the holes are shown also on the "W.M." blueprint.

The next step is to fix the remainder of the parts to the underneath of the baseboard. There is only one point to be specially noted about this part of the assembly.

It is desirable that the fixing screws should be on the short side, so that the ends do not project up through the metal foil covering the

It is a good plan to cross through the numbers on the blueprint as the leads are completed: there will then be no possibility of making a mistake.

Connections shown on the blueprint as solid black lines should be made with tinned-copper wire and oiled-cotton sleeving; wires shown as "open" or parallel lines should be flexible; and wires shown dotted are actually flexible or spaghetti resistances.

The new low-impedance screen-grid valves are suitable for the set, while the detector should be of comparatively low impedance as it is intended for operation under "power-grid" conditions. A value of about 15,000 ohms will be satisfactory.

## Suitable Pentode

Any standard pentode will be suitable, but it should be noted that some take greater anode currents than others. The pentode is matched up with the high-resistance loud-speaker by means of a tapped output transformer, which has ratios of 1 to 1, 1 to 1.6, and 1 to 2.7. These ratios should be tried in turn until the best reproduction is obtained from the set.

By far the most important part of the preliminary operation is the correct ganging of the set: upon that depends the entire efficiency. Ganging is regarded by many constructors as being a difficult job to tackle, but really it is very simple if done systematically and with the aid of a milliammeter.

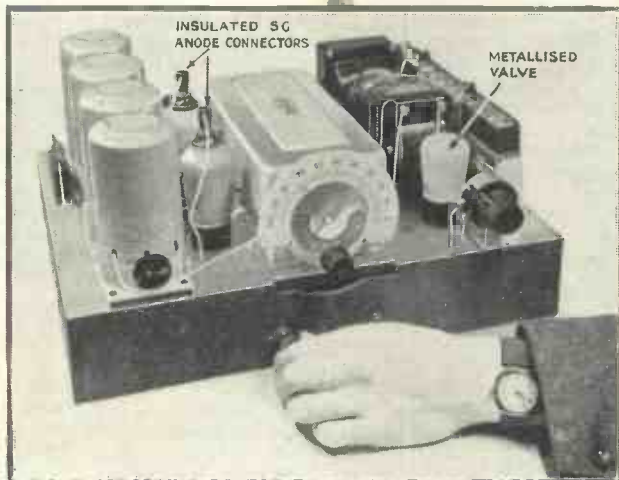
If a milliammeter is available—and every constructor should have one, as it will always be useful—it should be connected in the anode circuit of the detector valve. This can be done by breaking the lead No. 58 and connecting the meter at this point. The meter should read from 0.5 milliamperes.

## How to Gang the Set

When the set is switched on it should be tuned to a fairly loud signal on the upper part of the medium waveband and the screws of all four trimming condensers (lettered W, X, Y and Z on the blueprint and on the wiring diagram that appears on page 26) should be undone to the fullest extent by means of a pair of long-nose pliers.

Note the extent of the dip in the milliammeter reading as the tuning knob is turned through a small arc around the position of the particular station being received.

The greater the dip of the pointer, the greater is the strength of signal being received. This gives us the clue to the best settings



THE QUADRADYNE ALL READY FOR USE

Here is the set completely wired up and with the valves in position ready for use. The anode-current consumption is only about 15 milliamperes

top of the baseboard. There is no danger of a short-circuit occurring, even if this did happen, but it would not improve the appearance of the top of the set.

## Wiring the Set

It will take a little longer to wire the Quadradyne than it does the average four-valve set because many of the connecting leads must be led through to the underneath of the baseboard.

It will be noticed that each lead is numbered separately and the wires should be put in position in the numerical order thus indicated.

Holes for the wires to go through the baseboard are marked with letters. For instance, hole *a* on the top of the baseboard corresponds to hole *a* on the underside. With these letter references there will be no difficulty about the wiring provided the leads are put in numerical order.

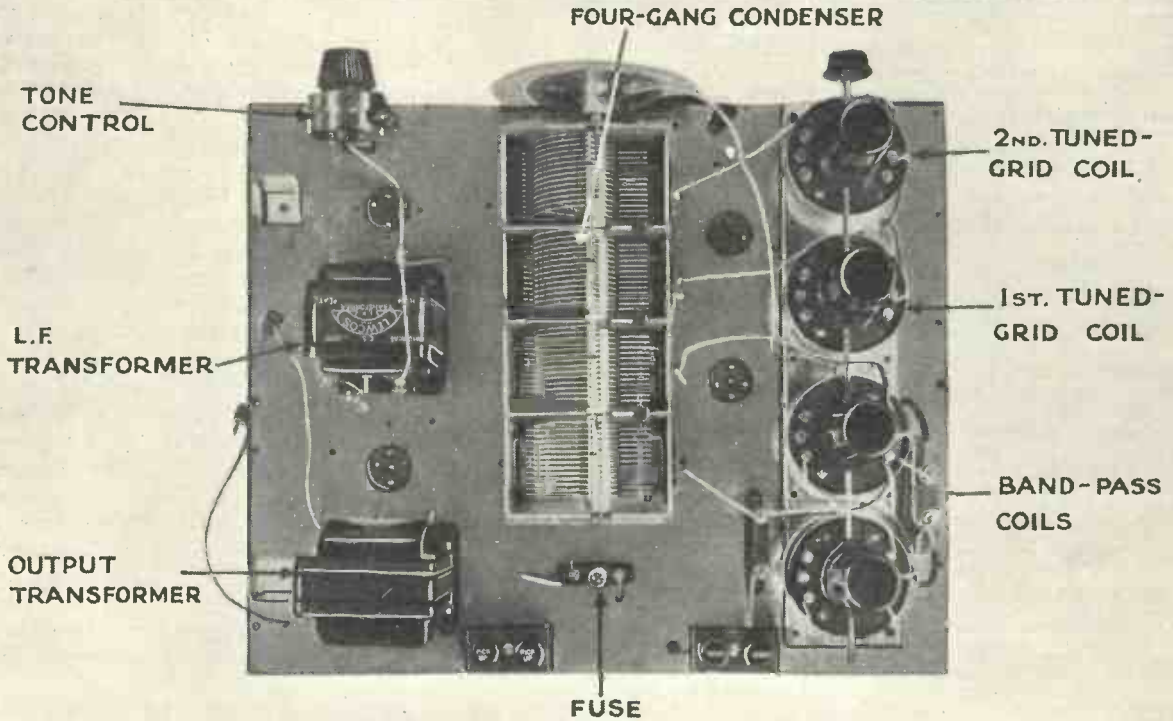
were held together by means of a screw fixed into the underside of the baseboard.

It is recommended that the screen-grid and detector valves for the Quadradyne should be of the metal-lised type, as the metal covering on the bulbs will help to complete the screening given by the coil and gang-condenser covers and the foil on the top of the baseboard.

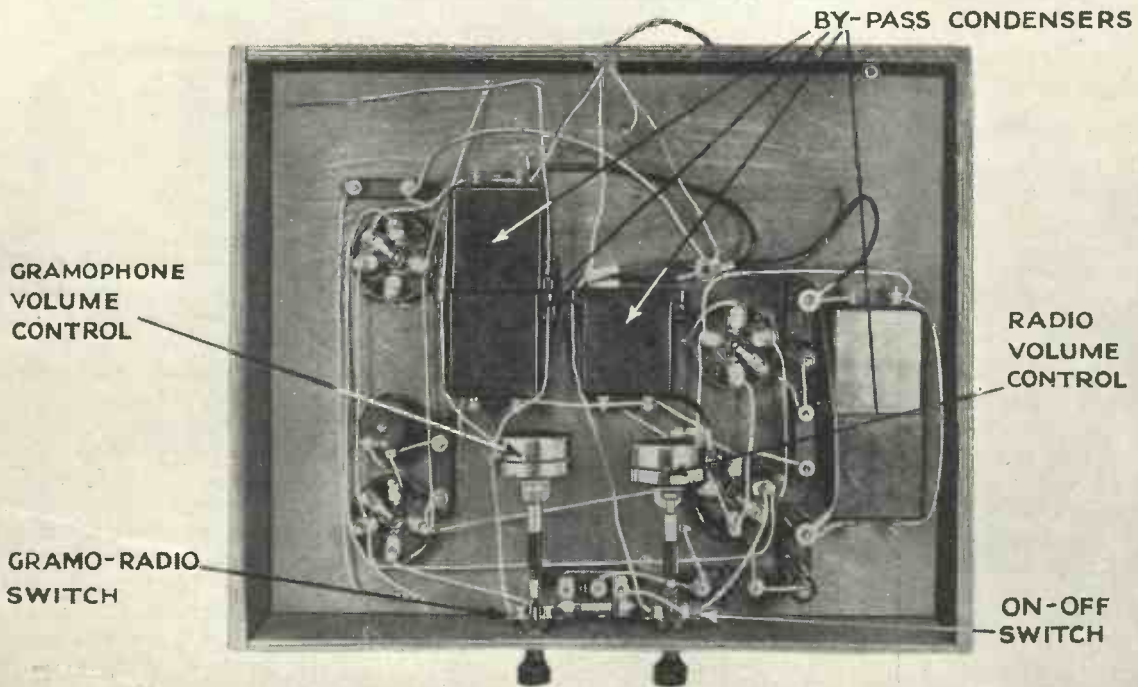
### SPECIAL FEATURES OF THE QUADRADYNE

1. Four tuned circuits, including band-pass aerial tuning, give a high degree of selectivity.
2. There is only one tuning knob to manipulate.
3. Two screen-grid high-frequency valves ensure great power from dozens of European stations.
4. There is a combined radio volume control and on-off switch.
5. There is also a combined gramophone volume control and gramo-radio switch.
6. A tone compensator is included to meet individual preferences in "balance" of quality.
7. With a 120-volt battery the anode-current consumption does not exceed 15 milliamperes.
8. Very complete screening ensures complete stability in operation.
9. A special baseboard-chassis form of construction is utilised.
10. The cost of construction, with valves but without batteries, cabinet and loud-speaker, is only £14 (approximately).
11. A full-size blueprint is available for 9d., post free, by using the coupon on the last page of this issue.
12. Rough calibrations can be found from the special test report on page 27 of this issue.

*So Simple that Anyone Can Build It*



*Note the clean appearance of the layout of the top of the baseboard*



*There is nothing complicated about the underside of the baseboard either*

# THE QUADRADYNE—Continued

## COMPONENTS NEEDED FOR THE QUADRADYNE

### CHOKES, HIGH-FREQUENCY

- 2—Watmel, type DX3, 8s.
- 1—Wearite, type HFS, 6s. 6d.

### COILS

- 1—Colvern coil assembly (1 pair KBLG ganged with 2 KCG's), £1 17s. 6d.

### CONDENSERS, FIXED

- 1—T.C.C. .00005-microfarad, type 34, 1s. 6d.
- 1—T.C.C. .0001-microfarad, type SP, 2s. 4d.
- 1—T.C.C. .0001-microfarad, type 34, 1s. 6d.
- 1—T.C.C. .0002-microfarad, type 34, 1s. 6d.
- 1—T.C.C. .0003-microfarad, type 34, 1s. 6d.
- 1—T.C.C. .01-microfarad, type 40, 1s. 9d.
- 1—T.C.C. .05-microfarad, non-inductive type, 1s. 9d.
- 1—T.C.C. 1-microfarad, type 50, 2s. 10d.
- 4—T.C.C. 2-microfarad, type 50, 15s. 4d.

### CONDENSERS, VARIABLE

- 1—British Radiophone .0005-microfarad four-gang, with metal cover and disc drive, £2 7s.

### HOLDERS, VALVE

- 4—W.B., sub-baseboard type, 5s.

### METER

- 1—Bulgin 0-5 panel-mounting milliammeter, £1 10s.

### PLUGS AND TERMINALS

- 4—Belling-Lee terminals, marked: Aerial, Earth, Pick-up (2), 2s.
- 2—Belling-Lee spade terminals, marked: L.T.+, L.T.—, 4d.
- 5—Belling-Lee wander plugs, marked: H.T.+, H.T.—, G.B.+, G.B.—, 1, G.B.—2, 1s. 3d.

### RESISTANCES, FIXED

- 1—Varley 1,000-ohm spaghetti, 9d.
- 1—Varley 5,000-ohm spaghetti, 9d.
- 2—Varley 10,000-ohm spaghetti, 1s. 6d.
- 1—Varley 30,000-ohm spaghetti, 1s.
- 1—Varley 40,000-ohm spaghetti, 1s.
- 1—Dubilier 50,000-ohm grid-leak, 1s.
- 1—Dubilier 1-megohm grid-leak, 1s. 9d.

### RESISTANCES, VARIABLE

- 1—Wearite 25,000-ohm potentiometer, type Q34 IS, with insulated spindle ends and bracket, 4s. 3d.
- 1—Wearite 50,000-ohm potentiometer and on-off switch, types Q35 and G22, 5s. 6d.
- 1—Wearite .25-megohm potentiometer and single-pole changeover switch, types Q21 and G24, 6s. 2d.

### SUNDRIES

- Tinned-copper wire for connecting (Lewcos).
- Lengths of oiled-cotton sleeving (Lewcos).
- Length of rubber-covered flex (Lewcos).
- 2—Belling-Lee terminal blocks, 1s. 4d.
- 1—Sheet of No. 32 or 34 gauge aluminium foil 16 in. by 13 in.
- 1—Pair Bulgin grid-bias battery clips, No. 1, 6d.
- 1—Readi-Rad fuseholder and bulb, 1s. 3d.

### TRANSFORMER, LOW-FREQUENCY

- 1—Lewcos, type LFT5, 10s.

### TRANSFORMER, OUTPUT

- 1—Ferranti, type OPM1, £1 2s. 6d.

### ACCESSORIES

#### BATTERIES

- 1—Drydex 120-volt, orange series, £1 4s.
- 1—Drydex 18½-volt, green series, 2s. 6d.
- 1—Exide 2-volt accumulator, type ICZ5, 15s. (or Smith's).

#### CABINET

- 1—Clarion, £1 7s. 6d.
- 1—Clarion baseboard assembly, 3s. 6d.

#### LOUD-SPEAKER

- 1—Amplion MC9, cabinet model, £9 9s.

#### VALVES

- 2—Six-Sixty 215SG, £2 (or Mullard PM12, Cossor 220SG).
- 1—Six-Sixty 210D, 8s. 6d. (or Mullard PM21X, Cossor 210 Det.).
- 1—Six-Sixty 230PP, £1 (or Mullard PM22, Cossor 230PT).

(If it is desired to run this set with an A.C. high-tension unit, a Regentone W4A, price £5 5s., is recommended.)

aerials with which the set may be used approximately of the same electrical value.

This means that the wavelength readings included in the special test report that appears on page 27 hold good roughly for every model of the set made up. The readings will not always be exactly the same, but they will be within a degree or two, and will be sufficiently close to enable the operator to calibrate his set roughly right at the beginning. This is a point that will be found of great convenience by all constructors of the Quadradyne.

### Set to Be Proud Of

There is little more to be said about the set. If the layout is carefully followed and the ganging instructions systematically carried out, then there is little chance of failure. The "Wireless Magazine" Technical Staff is proud of the Quadradyne and has no doubt that readers who build it will be equally pleased with the good results that are obtained.

Remember that the design is really the last word in high-power screen-grid band-pass technique and that if it is properly made the set cannot fail to give satisfaction.

### Reports Invited

The Editor of "Wireless Magazine" invites all constructors of the Quadradyne to let him know of the results obtained in their particular districts: such information is of the greatest value to the Technical Staff.

Remember, also, that half a guinea is paid for each photograph of a home-constructed "Wireless Magazine" set published in these pages.

By sending a report on the capabilities of your version of the Quadradyne and a photograph of it, you will not only have the satisfaction of knowing that you are helping the "Wireless Magazine" Technical Staff with valuable information, but you will also have a chance of getting half a guinea for your trouble.

So get on and build the set right away!

of the trimming condensers. Still keeping the set tuned to a station, screw in the trimmer marked Z, turning the main tuning knob so that the extent of the dip can be watched.

### Tuning for Maximum Dip

As the trimmer is screwed in, the extent of the dip will increase, but after a few more turns the dip will again decrease. It is now necessary to turn the screw head back to the point where the greatest dip was experienced.

This procedure should be followed out with the adjustments of trimmers W, X and Y, in that order.

Remember that all the time the set must be kept tuned to the same station. If ganging is done at a fairly high wavelength on the medium waveband it will hold good over the entire range of wavelengths covered by the coils used.

A detector milliammeter is such a great convenience in tuning a set of the Quadradyne type that in the

original model one of these instruments was permanently mounted in the top of the cabinet, as can be seen from the photograph on page 24. A station is always tuned in at the greatest strength when the biggest dip is obtained on the milliammeter.

In the aerial lead of the set is a condenser of .00005 microfarad capacity. This has the effect of making the effective lengths of any



ADJUSTING THE TRIMMING CONDENSERS  
A pair of long-nose pliers will be needed for adjusting the screw heads of the four trimming condensers. The operation is not at all difficult

# RADIO MEDLEY

\* A RADIO FAN'S CAUSERIE CONDUCTED BY BM/PRESS \*

*British Television Developments :: Gramophone History :: Moving-coil Loud-speaker Disadvantages :: Hospital Radio Troubles :: Self-contained Sets :: A Problem from Hong Kong :: Condenser Ganging Troubles :: Radio Text Books :: D.C. Mains Amplifier*

## British Television

I am glad to learn that the B.B.C. is to start experimental transmissions of a new system of television. The Baird transmissions will still be carried on, I believe. This development must mean that there is a chance of real progress being made soon and we shall all watch the results with real interest.

By the way, do you know that the Baird Company actually pay the B.B.C. for putting out their television transmissions and on top of that have also to supply the necessary programme material at their own expense?

Nobody can say that the B.B.C. is wasting public money on transmissions of doubtful interest to the majority of listeners.

## Gramophone History

One of the most interesting lectures and demonstrations I have been to recently was that given by Mr. J. H. A. Whitehouse in aid of the King Edward's Hospital Fund for London. When I first met Mr. Whitehouse some four years ago he was with the B.B.C., but he is now on the Gramophone Company's staff.

His lecture was most entertaining, being "illustrated" by excerpts from records made years ago by some of the first recording artists. He also reminded us that the pioneer work on the gramophone—or the phonograph, as it was then called—was done by Edison and Bell, the inventor of the telephone. Tainter, an Englishman, introduced the use of wax and Berliner gave us the disc in place of the cylinder.

Some of the demonstrations were intended to show the improvements that electrical recording have given

us: the difference between some of the old acoustic recordings and the latest electrical recordings was really amazing.

Mr. Whitehouse made the point that we take the gramophone too much for granted, and in that he is right. It is one of the greatest achievements of our time.

## Moving-coil Disadvantages

More and more constructors seem to be falling into agreement with my view that the small types of permanent-magnet moving-coil reproducers do not give good results when run from the average small two- or three-valve set. My latest correspondent to agree with this is Mr. Ernest Anson of Hindhead.

Mr. Anson says that he has tried a number of moving-coil models on his set—a three-valver run from a mains unit, but none of them beats his Amplion cone. He has, however, come across another cone which he states to be better than *any* loud-speaker he has yet heard, particularly on low notes.

This particular model is at present unknown to me, but I am making some further inquiries about it.

## Hospital Radio

Last month, you will remember, I had something to say about the sad state of disrepair into which many hospital radio installations seem to have fallen. Now a correspondent—Mr. M. Odam of Mitcham—tells me from his own experience of some of the troubles that occur.

Most of the trouble is that the hospitals have no spare money to spend on keeping their installations in order; all the funds at their disposal are required for more urgent purposes.

In one case that came to Mr. Odam's notice the trouble was always broken phones, crossed phone leads, and broken wall plugs, short-circuiting the whole installation. The result is, he says, that out of sixty pairs of phones, five or six loud-speakers, and thirty or forty wall sockets, perhaps only a dozen points are in order.

It seems to be a great pity that all the money originally subscribed is being put to such little use. If and when I ever go to a hospital as a patient (touch wood!) I shall certainly arrange to take a portable set with me!

## Another Experience

Since I wrote the preceding paragraph I have had a letter from a man who is a patient in a London hospital.

He has now been there for a month and during that time has only been able to listen in for about two weeks. There was nothing doing at all during Christmas week.

My correspondent says: "It seems to me the trouble lies with the hospital authorities. Invariably the installation is presented gratis, but after this it becomes a nuisance to the authorities and an unwanted expense."

This would-be listener perhaps feels more than others the lack of broadcast entertainment, for when he is well and about his work lies in wireless.

## What Goes Wrong?

From Weymouth comes a letter from someone who has had practical experience of the troubles that develop in hospital installations. This correspondent had the job of changing bedside terminals for plugs and sockets. Inquiries among the

## RADIO MEDLEY—Continued

Look out for another fine issue of  
WIRELESS MAGAZINE  
on Friday, February 19.

It will contain all the regular features so popular among readers, and will also contain details for building some fine new sets. Articles by W. James, J. H. Reyner, H. J. Round and P. K. Turner will also be included. Make sure of a copy by ordering from your newsagent now!

patients brought to light the information that reception was very bad and that sometimes the installation was not put on all the evening.

### Four Causes of Trouble

There seem to be four reasons for the inefficiency of the service in this particular case: (1) no one on the hospital staff to take charge of the installation, (2) patients bringing with them their own phones, which may be of the wrong resistance, (3) people working in the hospital are inclined to be rough with the radio wiring when it comes in their way, and (4) phones having one earpiece out of order altogether.

One solution of this difficult problem, as I suggested last month, would be for a band of skilled amateurs in each district to make themselves responsible for keeping their local hospital installation in good working order. This particular correspondent would be willing to join in such a scheme.

### Self-contained Sets

The month before last I mentioned that a frame aerial was hardly the sort of decoration one would choose for a house if one had an entirely free choice in the matter. Now I have received a letter from Mr. William Scott, of Alexandria (Dumbartonshire), saying that he has overcome this disadvantage with his Super 60 by enclosing the frame, together with the set, in a loud-speaker cabinet.

Two snags are likely to arise from this practice, although I admit that it has the merit of making the installation very tidy and neat. I think that trouble might arise in some cases through the frame being so close to the components in the set and there is the further disadvantage that to make use of the directional properties of the frame the whole cabinet must be moved round.

All the same, the scheme is worth trying. It is possible that there might be no interaction—Mr. Scott evidently gets none—and the Super 60, as I know well from prolonged experience with it, will bring in a large number of stations even when the frame aerial is kept pointing in one direction all the time.

### From Hong Kong

From Hong Kong comes a strange request. It is from a lieutenant on board H.M.S. *Medway*, and I cannot do better than quote it:

"About the middle of 1933 a party of four of us are going to sail to England in a 35-ton yacht. What I should like to know is the type of set to have. The main use of the set will be for weather forecasts and press news (morse), but I should, of course, also like to be able to receive the broadcasting stations, too. It must also be possible to fit a short-wave adaptor."

Well, there is a nice little problem for you to solve. My own feeling is that the sort of set that would be useful for these conditions would be one with two screen-grid high-frequency stages. It would also be necessary to have a set with a very economical battery consumption, for I imagine it would not be easy to get replacements *en voyage*.

If you have any other suggestions to make I shall be pleased to pass them on to the right quarter. There is one good thing about this proposition—plans are evidently being made well in advance.

### Trouble with Ganging

It appears from more than one letter I have had recently that many amateurs still have difficulty in ganging their receivers. I do not think there should be any great trouble, however, if the operation is carried out systematically.

The fact that trouble is experienced by some people is another point in favour of my recent suggestion that what we need is a complete band-pass tuning unit, with the coils and condensers fixed up in one box, and sent out from the factory already ganged.

From a remark I overheard between two manufacturers the other day I think we may see something of

the sort at the next exhibition. Let us hope so, anyway!

### Gang Condensers

One difficulty about using gang condensers is that the trimmers are provided with screw heads that are difficult to adjust. When the coils are placed alongside the condenser, as they nearly always are in modern designs, there is often no space to get a screwdriver to work.

The "Wireless Magazine" Technical Staff were instrumental, I believe, in getting one maker to replace the screw heads on the trimmers with star-shaped wheels that could be pushed round by means of a screwdriver held vertically over them.

More manufacturers of gang condensers should make this or a similar alteration to their designs so that they can be more easily trimmed up.

### Radio Text Books

Can anybody tell me of a good radio text book suitable for the advanced amateur? There seems to be a dearth of such literature in this country. Occasionally I see American books that seem to fit the bill, but Yankee technique differs so much from ours that most of their literature needs considerable modification for consumption over here.

There is certainly need for a good practical book to meet the needs of the advanced amateur—something fairly "highbrow" is wanted, but without any complex mathematics.

### D.C. Mains Amplifier

In these notes a month or two ago I mentioned that I had been trying out an experimental D.C. amplifier loaned to me by the "Wireless Magazine" Technical Staff. Several correspondents have asked me to pass on the circuit so that they can try it for themselves.

As a matter of fact this amplifier was fully described in the December issue of "Wireless Magazine," under the title of the Quality Amplifier. I hope this information will enable several constructors to go ahead with the building of it. I have built one for myself and am still very pleased with the volume and good quality it gives.

BM/PRESS

London, W.C.1





SOMETHING LIKE A TRANSMITTING STATION!

Fig. 1.—Short-wave Transmitter House II at Nauen

WHENEVER, in the course of the last twenty years or so, I have called at the Nauen wireless station near Berlin I have noted more or less conspicuous changes reflecting the trend of radio engineering and pointing either towards a continuous development or towards an actual revolution.

Revolutionary changes have been going on during the last few years, transforming the celebrated wireless station into some sort of centre of the European short-wave service. In fact, Nauen at the present time is a nearly 100 per cent. (more exactly 95 per cent.) short-wave "power house."

One of the striking features about the new Nauen is the constant intermingling of long-wave and short-wave installations. There is no longer any separation between the two services, but long- and short-wave machines are found side by side.

#### In Main Building

Nauen's two latest and most up-to-date short-wave transmitters, a new type developed by Telefunken, have even been accommodated in the main building of the station, immediately beside the mammoth 400-kilowatt high-frequency machines.

Actual experience shows that there is no mutual interference, though wireless engineering is somewhat

puzzled to account for this unexpected behaviour.

The first short-wave transmitters were put into operation at the Nauen wireless station in 1924. There have, of course, ever since been constant improvements in the layout of these installations, and short waves have been assuming ever greater importance in the overseas wireless service. This will be readily understood by comparing the size and energy output of the plant required for long- and short-wave operating.

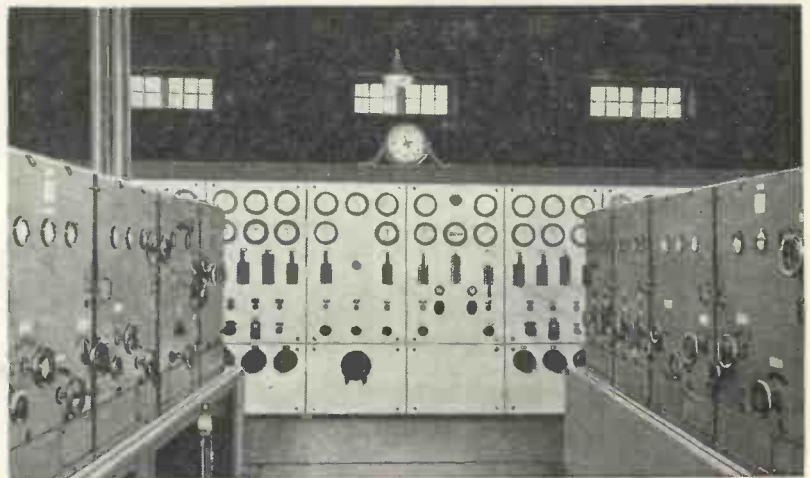
There are at present thirteen short-wave transmitters in operation at Nauen, taking care of part of the North American and the whole of

the South American wireless business.

Moreover, there are radio lines of communication with Mexico, Japan, China, Siam and many other overseas countries, Nauen acting in many cases as a relay station for communication between these and the rest of the European Continent.

#### Parts of Transmitter

A short-wave transmitting plant comprises the following three parts: the actual *short-wave transmitter*, namely, the generator and rectifier, where the high-frequency energy is produced and controlled (modulated); the *aerial system* radiating



HOW WOULD YOU LIKE TO OPERATE THIS STATION?

Fig. 2.—Inside view of Short-wave Transmitter House II at Nauen

## THE NEW NAUEN—Continued

this energy out into space; and the *energy conductors* which serve as a link, conveying the high-frequency energy from the transmitter to the aerial system, situated in many cases at a considerable distance from the station.

The main difficulty in connection

fluctuations of temperature to a maximum of 1/50 degree Centigrade. This is an accuracy much in excess of that of a timepiece of high precision.

Fig. 1 is an outside view of Short-wave House II, situated some hundreds of yards away from the main

ard three-phase current of the mains in a six-phase arrangement, by means of water-cooled rectifier valves which are of about the same dimensions as the water-cooled transmitting valves.

### Generating Gear

Fig. 3 shows the machine and rectifier hall of Short-wave House II, the high-tension machines set apart to supply the continuous-current voltage (1,300 volts and 3,000 volts) for the various stages of amplification being seen in the row of machines farthest to the left. In the background there are installed the rectifier valves (six for each transmitter).

All the machinery is controlled and started from the switchboards seen in Fig. 4, which, being installed beside the transmitters, enable a constant watch to be kept of these and all the machinery.

### Wavelengths Used

Wavelengths intermediary between 14 and 30 metres have proved particularly suitable for the overseas service, those below 20 metres being used during daylight hours (over the larger part of the distance to be covered), whereas the longer waves are particularly suitable for night use, enabling a communication to be established during times of dawn and darkness.

Provision has been made for a changeover from the longer to the shorter waves—or vice versa—to be effected at short notice.

These transmitters are generally



PRODUCING POWER FOR WORLD-WIDE COMMUNICATION  
Fig. 3.—Machinery hall in Short-wave Transmitter House II

with transmitters is the maintaining of a constant frequency which, in order to secure a satisfactory reception and to avoid interference between two neighbouring transmitters, should vary at most by a few cycles.

This constancy is obtained by the use of a crystal in a "thermostat," securing an invariable temperature. The crystal is a small quartz plate placed between two metal plates and connected up to the grid circuit of the first oscillatory circuit of the transmitter.

### Constant Frequency

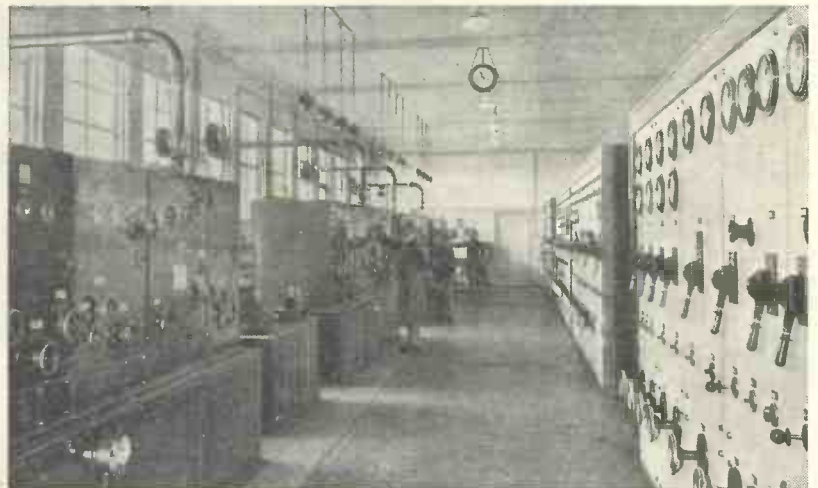
This small crystal plate has a well-defined characteristic vibration tuned to the frequency to be transmitted, which is thus impressed upon all the oscillatory circuits. In fact, the tiny oscillating quartz controls the whole system.

Now, the characteristic oscillation of the crystal can only be altered by fluctuations of temperature and air pressure. This is why the crystal is placed in a vacuum, its temperature being kept constant by automatically-operated heating resistances encompassing it.

The sensitiveness of regulation is such as to reduce any possible

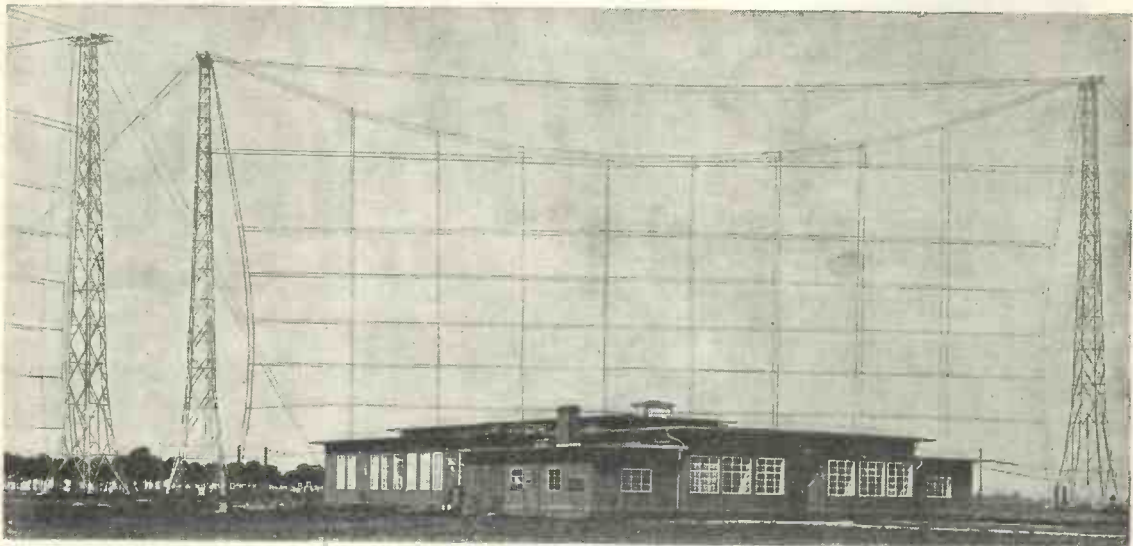
station building, and Fig. 2 shows two up-to-date short-wave transmitters installed there. Each of the various amplifier stages has been fitted into a metal case, so as to screen off any outside influence.

The output stage of each comprises two water-cooled valves each of 20 kilowatts, which are operated at an anode voltage of 10,000 volts. This enormous continuous-current voltage is generated from the stand-



WHERE THE SHORT-WAVE SIGNALS ARE PRODUCED  
Fig. 4.—Switchboards in Short-wave House II at Nauen

# 95 PER CENT. SHORT WAVES NOW



A FINE VIEW OF A BEAM TRANSMITTING AERIAL

Fig. 5.—Outside view of Short-wave Transmitter House I and the beam aerial system

controlled by modulation in the last stage, but one is worked by means of a special morse-key apparatus which, by operating a switch, enables a rapid change-over from telegraphy to telephony to be made.

### Efficient and Reliable

The great efficiency and reliability of this short-wave overseas service are, of course, mainly due to the high degree of perfection to which beam aerials have lately been developed. These can be calculated in every detail so as to suit the requirements of each given case, the calculated characteristics fully agreeing with the characteristics ascertained by an actual test.

The latest type of beam aerial, as used at Nauen in connection with the transatlantic service between the European Continent and North and South American, is made up of 192 di-poles.

### Radiator and Reflector

There are two symmetrical systems, namely the radiator and reflector respectively, which are coupled together inductively through an enclosed high-frequency transformer.

Inasmuch as there is an absolute shadow behind the reflector, the whole of the radiation is sent around the earth in one well-defined sense only, thus greatly increasing the efficiency of beam aerials.

These aerials are, by the way, highly perfected engineering pro-

ducts also from a mechanical point of view, the individual wires being so thin as to be hardly visible and being stretched by a multitude of small weights.

The radiated energy is thus concentrated along a well-defined beam starting from the surface of the earth at a flat angle.

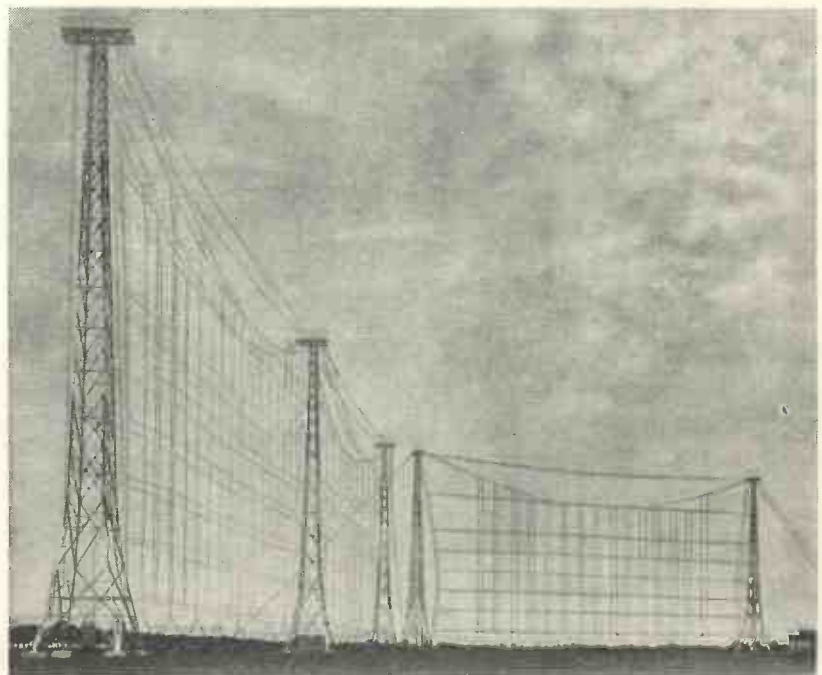
The reflector is situated at a distance of one-quarter of a wavelength behind the aerial proper.

The feeding lines are concentric

copper tubes, the outer tube being earthed and the inner tube, which serves to carry the high-frequency potential, screened perfectly against any outside influence. Double wires are used to feed the individual di-poles.

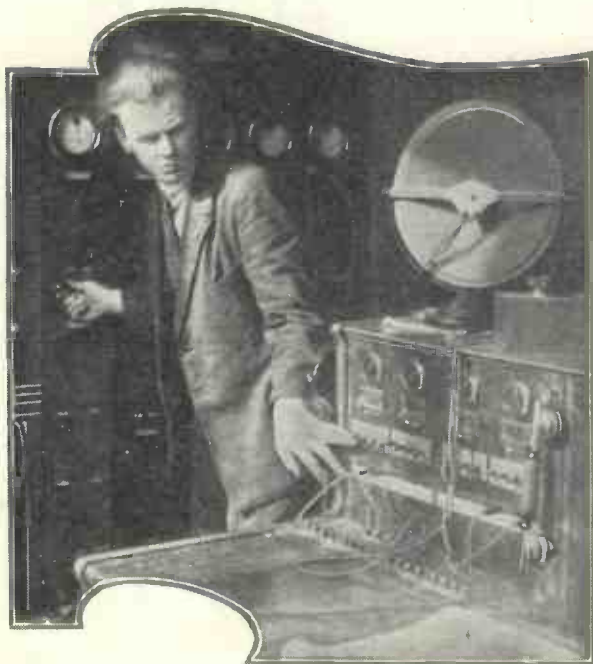
### Long Waves as Stand-by

The long-wave service is maintained mainly as a stand-by and as a means of correcting any mutilated signals.



ARRANGEMENT OF THE DIRECTIONAL BEAM AERIALS

Fig. 6.—General view of the Nauen short-wave beam transmitting aeriels



**MODERN TRANSMITTERS GIVE HIGH QUALITY**

Broadcasters take elaborate precautions to maintain a high standard of quality. This is an exclusive "Wireless Magazine" photograph of a Russian station

**I**N my December article on quality, I described a power amplifier for getting "A-quality" results. It took 50 milliamperes at 500 volts, and was naturally for A.C. mains only.

**Power and Economy**

Now I don't need to be told that there are tens of thousands of people who either haven't got A.C. mains, or who can't or don't want to spend some £20 or so on the power amplifier alone, even for the sake of "A-quality" results.

So now I'm going to show how to get "C-quality" results—a pleasant noise even if not really faithful reproduction—with the minimum of high-

Before I explain just what this means, let us go through the ordinary push-pull circuit, to refresh our memories. The two valves are connected as in Fig. 1. The input transformer makes one grid more negative at the same instant that it makes the other more positive.

The two halves of the output transformer primary are exactly alike, so the effect of the two valve anode currents, each in one half, is exactly the same in its effect on the secondary as if there were one primary, carrying the *difference* between the two anode currents.

At the same time, the battery has to supply, altogether, the *sum* of the two anode currents.

# ECONOMY PUSH-PULL

By P. K. TURNER, M.I.E.E.

An article that goes into the economics of high-quality reception. The author explains an unusual "bottom-bend" circuit for push-pull valves which gives good quality at lower cost than the standard arrangements. Previous articles by P. K. Turner on quality of reproduction have appeared in "Wireless Magazine" for December and January

tension power. Now look at Fig. 2. Here AB is the curve of the valve. Suppose we were using one valve in the ordinary way, with a grid swing from O to C, we should get distortion, due to the curvature of the valve characteristic. "bottom-bend push-pull."

If we use two valves, in push-pull, then the volts on the two grids are always an equal amount on either side of the centre point D. Thus, for example, when the audio inputs to the two valves are 2 volts each, their grids are at -5 and -9 volts (points E<sub>1</sub> and E<sub>2</sub>). The anode currents at that instant are 13.8 and 8.4 milliamperes (points F<sub>1</sub> and F<sub>2</sub>). And the *effective* current in the output transformer is F<sub>1</sub>-F<sub>2</sub>, which is shown as the point G corresponding to E<sub>1</sub>.

**No Distortion**

Working out the values of effective current for various grid volts, we get the line HK. It is clear that this line is so nearly straight that distortion is negligible. Don't be disturbed

**OUTPUTS OBTAINABLE FROM MULLARD PM202 POWER VALVES**

| High-tension Volts | Arrangement                    | Idle Current in Milli-amperes | Prob-able Bias Voltage | Total Grid Swing Required (volts) | Max. Output in Milliwatts | Efficiency    |               | Proper Load Impedance (ohms) |
|--------------------|--------------------------------|-------------------------------|------------------------|-----------------------------------|---------------------------|---------------|---------------|------------------------------|
|                    |                                |                               |                        |                                   |                           | On Full Input | Average Input |                              |
| 120                | Push-pull .. .. .              | 5.6                           | 15                     | 60                                | 533                       | 32%           | 7%            | 5,000                        |
|                    | One Valve .. .. .              | 20                            | 12                     | 22                                | 350                       | 11½%          | 1½%           | 3,000                        |
| 150                | Two Valves in Parallel .. .. . | 40                            | 12                     | 22                                | 700                       | 11½%          | 1½%           | 1,500                        |
|                    | Push-Pull .. .. .              | 7                             | 18                     | 74                                | 1,000                     | 34%           | 7½%           | 4,500                        |
| 170                | One Valve .. .. .              | 17                            | 15                     | 30                                | 511                       | 17%           | 2%            | 3,800                        |
|                    | Two Valves in Parallel .. .. . | 34                            | 15                     | 30                                | 1,022                     | 17%           | 2%            | 1,900                        |
|                    | Push-pull .. .. .              | 8                             | 21                     | 84                                | 1,360                     | 34½%          | 8½%           | 4,000                        |

at half this line being *negative* current—it must be negative whenever the current in the valve  $V_2$  is greater than that in  $V_1$ .

The battery current is the sum of the anode currents in the two valves. It is shown as LM, and varies, but not much, with the amount of input grid volts.

**Need for Efficiency**

What has this arrangement given us? Twice the output power that we should have got with one valve, but twice the drain on the high-tension battery. And practically no distortion. But we have not gained in efficiency, which is

$$\frac{\text{Audio output power}}{\text{High-tension battery power}}$$

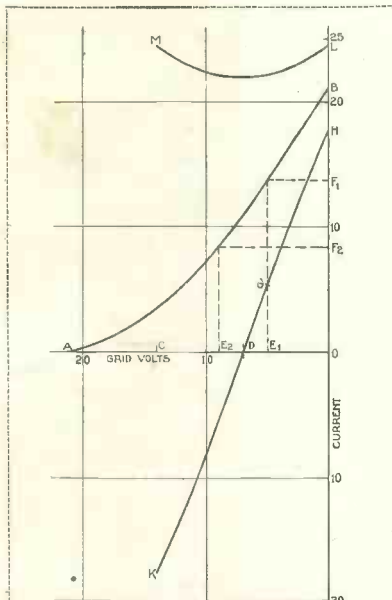


Fig. 2.—Valve characteristic curves showing the operating conditions for two valves in push-pull

And if we are going to get good results from batteries, we *must* somehow increase the efficiency.

You will easily see why if I give you some figures. As an example I will take the Mullard PM202—a very good low-power output valve. If we stick to the makers' recommendations, and use only 150 volts high tension, and set the valve to the maximum steady current of 20 milliamperes, then I have worked out that allowing 5 per cent. of harmonics we get an output of 350 milliwatts.

But the input power is 20.8 milliamperes (the steady current rises a little at full audio input, owing to the distortion) at 150 volts; or 3,120 milliwatts. So that the efficiency is

only  $11\frac{1}{2}$  per cent. For every pound note we spend on high-tension batteries for this power stage, only 2s. 4d. worth goes into the loud-speaker.

And there is worse to come; for this calculation is for the comparatively small part of the programme that is of maximum loudness. During silence, of course, the efficiency is nil. For music, it is not far out to say that the *average* grid swing is only  $\frac{1}{3}$  the maximum, which means that the output power is  $\frac{1}{9}$  of 350, that is about 40 milliwatts.

But the input power has to be kept at 3,000 milliwatts, waiting to deal with the loud notes, so that the average efficiency is  $\frac{40}{3,000}$  or 1.3 per cent.—our 2s. 4d. worth per pound spent has dwindled to just over 3d. worth on the average!

We can't, alas, raise the efficiency to the 90 per cent. or more of most electrical machinery; but we can do better than 1.3 per cent. Look at Fig. 3. Here is the same valve curve as in Fig. 2; but suppose we put two valves in push-pull, and then bias them to the point C, and give them twice the grid swing, that is, from O to P.

As before, the effective output current in the output transformer primary for a grid voltage of  $E_1$  is  $F_1-F_2$ , and the result is the line BK. As you will see, it is practically straight, so distortion is negligible.

But look at BM, which is the battery current. It is very small when there is no audio input, and only rises when the input is applied to the stage. It is easy to see why it does this; the current into one valve goes up, but the current in the other cannot go down much, for it is nearly zero already; so their sum, which is the battery current, naturally increases.

The exact

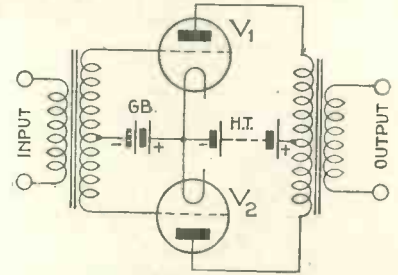


Fig. 1.—Typical circuit for push-pull output stage in power amplifier

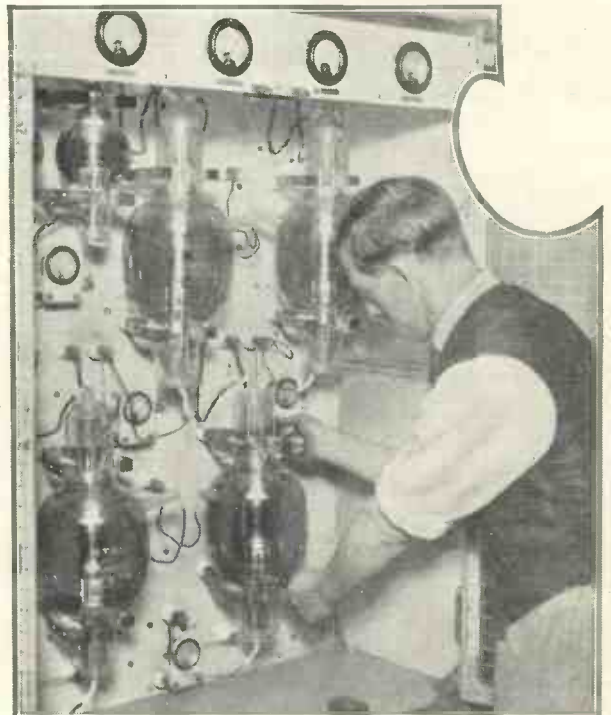
working out of the proper anode load, the mean battery current, and the output power, is not quite simple; but I have done it for several cases, and the results are given in the table.

**Batteries Last Longer**

We will take the case of the valve already mentioned, the Mullard PM202.

As I mentioned above, on 150 volts high tension this gives 350 milliwatts as a maximum output for 5 per cent. distortion. It takes 20 milliamperes, and on maximum input makes effective use of 2s. 4d. per £1 spent on its high tension. On average input it gives 40 milliwatts, or 3d. per £1.

But this maximum output of 350 milliwatts is very small. Suppose



LARGE "BOTTLES" FOR QUALITY

This is not a transmitter, but the equipment used by the B.B.C. at the Radio Exhibition for supplying power to loud-speakers on more than 300 stands

## ECONOMY PUSH-PULL—Continued

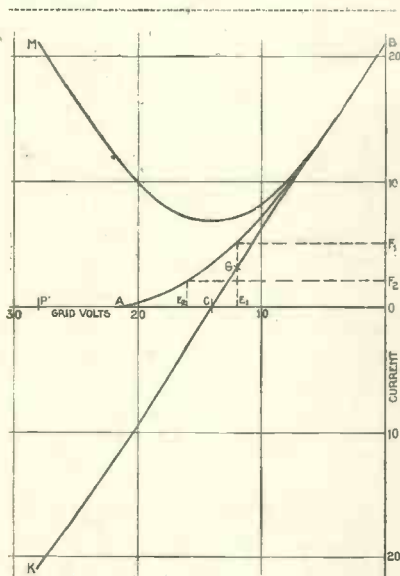


Fig. 3.—Effect of putting extra bias on the grids of two valves in push-pull

we raise the high tension to 170 volts. This gives a maximum output of 511 milliwatts with 6 per cent. distortion, and the high-tension consumption is 17 milliamperes, rising to 18 on full audio input. For maximum output the efficiency is about 17 per cent., or 3s. 4d. per £1—considerably better than before. But on average input it falls to 4½d. per £1.

Now let us first take the case where economy in upkeep has to be the first consideration. Using two of the same valves in bottom-bend push-pull, with 2.8 milliamperes each for no audio input (or total "idle current" 5.6 milliamperes), and only 120 volts of high tension, I find the maximum output is 533 milliwatts, with no distortion—more than before.

#### Increased Efficiency

The efficiency on full input is 32 per cent., or 6s. 6d. per £1; practically twice what the one valve gave us; and the efficiency on average input is 1s. 5d. per £1, or nearly four times what we had for one valve. Put in another way; if the 170-volt high-tension battery lasted three months before, we now use only 120 volts and it lasts nearly seven months.

On the other hand, suppose we continue to use a 170-volt battery, we can then get 1,360 milliwatts of maximum output with no distortion,

as against 511 milliwatts for the one valve. The "idle current," with no input, is 7.8 milliamperes instead of 17. The efficiency on full input is 34 per cent. or 7s. 1d. per £1 instead of 3s. 4d., and on average input 1s. 8d. instead of 4½d. per £1.

A battery which lasted us three months with the one valve will now last us nearly five months, although we are getting nearly 2½ times as much maximum undistorted power in the loud-speaker.

But, you will ask, what is the snag in all this? It looks too much like something for nothing!

Well, there are four disadvantages. The first and most obvious is that we have to pay for two valves instead of one. We also have to use two rather expensive push-pull transformers, instead of one ordinary one.

The total extra expenditure would be £2 or thereabouts. But you will get this back in a year or so, in battery saving, although there is another filament to be heated up by the low-tension battery.

Next there is the matter of getting the circuit to work. It simply *will not do* to bias the valves anyhow and hope you have the right setting. The two valves must be independently biased, and if they are not both set to the right current the distortion will be horrible.

It is essential to use a meter. And that means another initial expense if you haven't got one—though one well worth the money apart from push-pull; every home-constructor ought to have one.

Then there is the possibility of getting two valves that don't and won't match. It is a sad fact that

even the best makers' valves are not all alike, and if you just happen to get one of extra high magnification and one extra low, there will be distortion.

#### Getting Matched Valves

If you are friendly with the local dealer, ask him to try out one or two for you. The test is to see that they give about the same current as one another, both when biased down to the "idle" current, and also with much less bias, to give about the maximum rated current. If he won't or can't help you, write straight to the valve makers. They will pick you a pair, but will charge 10 per cent extra.

Lastly, there is the fact that a considerably greater grid power out is required to get maximum power out of the push-pull combination. In cases where the set has a volume control, and is normally used well within its maximum amplification, this doesn't matter; nor does it when a new set is being designed.

But if one is converting an old set with only just enough amplification anyway, it may mean an extra stage, or the substitution of better valves.

#### Working Conditions

Later on, I hope to show how to find the right load resistance, idle current, and bias for any valve, and also to describe the construction of a last stage of this kind. In the meanwhile, I give on page 36 a table giving three settings for the PM202, together with the maximum output, etc.; and for comparison I include the figures found for a single valve.

## BROADCAST IDENTIFICATIONS

In conjunction with Jay Coote, WIRELESS MAGAZINE has organised a new service that will be of great value to all listeners in calibrating a new receiver or compiling a log.

This Broadcast Identification Service, as it is called, is available for identifying stations from information supplied by readers. Only stations giving a regular broadcast service can be dealt with.

The fee is 6d. for identifying any one station, but if three identifications are required at any one time the fee is only 1s. A stamped addressed envelope must be supplied and the following details given:—

- 1.—What type of set are you using?
- 2.—Date and time when transmission was heard. A.m. or p.m.?
- 3.—Approximate wavelength.
- 4.—Call or interval signal, if heard.
- 5.—Details, if any, of programme received.
- 6.—WRITE LEGIBLY on one side of paper only.

Address your enquiry to Broadcast Identification Service, WIRELESS MAGAZINE, 58/61 Fetter Lane, London, E.C.4.

# AERIALS FOR MODERN SETS

By the "W.M." Set  
Selection Bureau

**O**FTEN when we are asked to recommend sets to prospective buyers the stipulation is made that the aerial must be self-contained. But with one or two notable exceptions the modern set needs some form of externally connected wire for the aerial.

Unless we are to limit our recommendations to the notable exceptions, which we cannot actually do owing to price limitations, we must therefore recommend the nearest approach to an absolutely self-contained set—a table or pedestal console.

## What They Contain

These consoles consist of large or small cabinets in which are housed the set, power supply, and loud-speaker. The only externals needed to put such sets into operation are aerial and earth and mains leads.

It might well be asked why, if there is a demand for absolutely self-contained sets, the manufacturers have almost unanimously conspired to thwart set buyers. The truth is that

stations at full loud-speaker strength with the most meagre aerial equipment. Usually, with a mains set, having one or more high-frequency stages, a short indoor aerial wire of say 40 ft. is ample to pick up a dozen or so of the worthwhile stations.

Set makers usually try to make a sales point of the fact that their sets



## FREE ADVICE TO PROSPECTIVE SET BUYERS

To take advantage of this service it is necessary only to mention (1) the maximum price and whether this is for a complete installation or the bare set; (2) where the set will be used; (3) what particular stations are desired; (4) whether a self-contained set with or without aerial, or an ordinary set with external accessories is preferred; and (5), in the case of mains driven sets, whether the mains are A.C. or D.C.

A stamped-addressed envelope for reply is the only expense. Address your inquiry to Set Selection Bureau, WIRELESS MAGAZINE, 58-61 Fetter Lane, E.C.4. There is no need to send any coupon, but it is essential to give the information detailed above on one side of the paper only. Tell your friends about this useful service.

unless a great deal of expensive smoothing is employed in the power supply an earth connection is needed to avoid mains hum. And while an efficient earth is being installed it is not much trouble to put up some sort of external aerial wire.

The modern set has a very considerable reserve of power, which means that it will reproduce home and foreign

will bring in a large number of stations with only a few yards of aerial wire. This, as our tests have proved, is often true enough, but there is one reception condition where the use of a small indoor aerial with a big set is a disadvantage. We refer to sets installed in houses where there is interference from electrical machinery.

Often we have found that a great deal of the mushy background accompanying the reception of broadcasting in such unfortunate circumstances is traceable to the undue amount of local interference picked up by induction on indoor aerials. The remedy is obvious—use a fairly large aerial slung clear of the interference source. Most modern sets are designed so that quite a long aerial can be used without unduly loading the input tuning circuit.

Lately, we have been interested in the results possible with the main conduit used as an aerial. Most of the

recently tested sets are provided with an aerial terminal for this mains use—that is to say, the A.C.-mains sets.

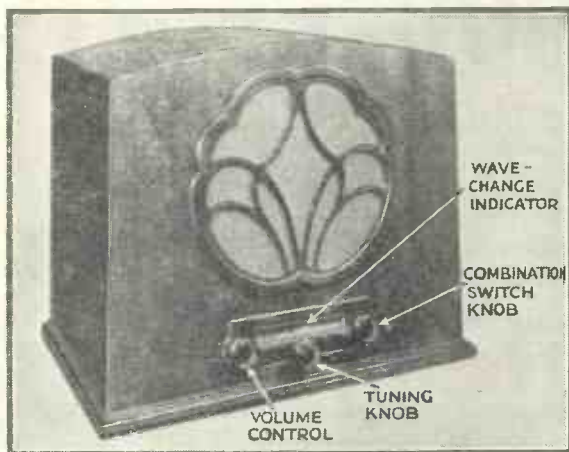
Tests indicate that with this form of aerial a good selection of foreign stations can be picked up at full loud-speaker strength, even on the three-valvers.

## Range and Selectivity

We have been interested to note that the particular mains socket used for the set has an appreciable effect on the range when the mains are used as the aerial. With one set we got half a dozen stations on a downstairs plug, whereas when the set was taken upstairs the number was increased to eighteen stations.

The selectivity of the mains aerial seems comparable to the average external aerial of about 60 ft. Certainly, there is no undue flattening of the tuning, nor, so far as we have found, is there any additional mains hum.

# H.M.V. Model 435 Three-valver



## HIS MASTER'S VOICE FIRST STRAIGHT RADIO

This three-valve is the first radio, as distinct from gramophone, set put on the market by the Gramophone Co., Ltd.

THIS is one of the best three-valve mains sets we have tried this season. Its many technical points will interest the enthusiast and its wonderful performance will thrill the ordinary listener. Here we have a very sensitive three-valver housed in a handsome walnut cabinet, which contains everything except the aerial and earth. Even the aerial can be dispensed with if the mains-aerial device is used.

### Refinements

Although described by the makers as a straight three-valver, the circuit of model 435 incorporates many refinements not found in the usual straight set. The valve sequence, as would be expected, is a screen-grid valve followed by a detector and a pentode output valve. But in front of the screen-grid amplifier is a capacity-coupled band-pass tuner, giving a high degree of good-quality selectivity.

Then we find that the screen-grid valve is coupled to the power-grid detector by means of the now popular choke-fed tuned-grid system. The detector is transformer coupled to the pentode by the parallel-feed method, with the anode resistance decoupled. The low-frequency transformer is one of the high-permeability core type, having a 7-to-1 ratio.

The actual valves used are from the Marconi range, comprising an MS4B for the screen-grid stage, an MH4 for the detector, and an MPT4 for the output stage. This output valve gives between  $1\frac{1}{2}$  and 2 watts undistorted output, which gives very great volume with the sensitive moving-coil loud-speaker employed in the set.

As the illustrations show, this three-valve circuit has been put into a well laid-

rotation a reaction condenser. Thus the sensitivity has a wide variation, with great simplicity of operation.

Equally ingenious is the other control knob, acting not only as a master switch, but as gramophone and wave-change switch.

As this switching is done the illuminated scale rotates, so that in, say, the medium-wave position the scale shows medium-wave calibrations and in the gramophone position this scale reads "Gramophone." We liked the flood-lit scale, particularly when reading off calibrations in searching for stations.

A good point about the tuning is that the scale remains in position while the pointer travels horizontally along it—much the most sensible way of arranging for the tuning operation.

The self-contained moving-coil loud-speaker is well designed, having the high flux density of 6,000 lines per square centimetre. There are many points of mechanical interest in the construction of this loud-speaker, but here it will have to suffice to say that

the output is extremely well balanced, top and bass notes coming out with a delightfully natural timbre. We carried out a few preliminary tests using the mains aerial attachment and we were greatly pleased with the strength and the quality of the local stations—quality being particularly impressive when the volume was considerable.

### No Mains Hum

There was no hum at all using the mains as the aerial, and the removal of the earth, while cutting down volume a good deal, did not add to the hum—proof of a well-smoothed power supply.

Sensitivity was equally good at the top and bottom ends of the tuning scale. Cologne and Budapest were taken as the two extremities, and both came in well.

Proper band-pass selectivity was obtained. The London stations were

### NUTSHELL SPECIFICATION

MAKER: The Gramophone Co., Ltd.

PRICE: 22 guineas.

VALVE COMBINATION: Screen-grid, power-grid detector, and pentode.

POWER SUPPLY: A.C. mains, 100 to 250 volts, 40 to 100 cycles.

POWER CONSUMPTION: 35 watts.

TYPE: Table console.

FINISH: Fine walnut cabinet work.

cut out within a reasonable wavelength band. National had a 25-metre spread, and Regional only 20 metres. These readings were on a 60-ft. aerial 20 miles from Brookman's Park. Selectivity improves as the wavelength increases. This is an advantage, as most of the best stations are above 300 metres.

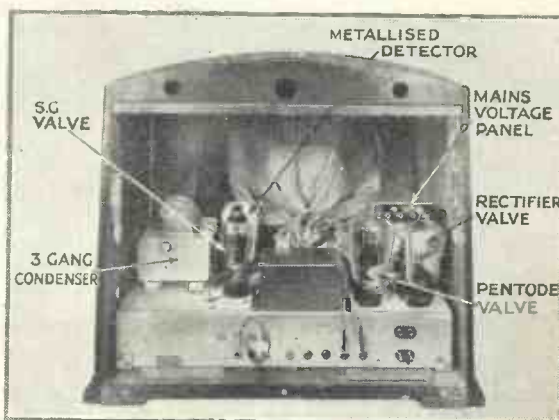
On the long waves, Zeesen was clear of interference—one could not wish for better selectivity.

Quality we cannot praise too highly. On all but very low volume the balance of tone is exceptionally fine.

This good quality does justice to the excellent B.B.C. regional transmissions and, due to the power-grid detector, the reproduction is not impaired by using the set close to a broadcasting centre.

As the volume control works on the gramophone pick-up, there is no need for an external volume control when connecting a pick-up to the two terminals provided. With an H.M.V. pick-up we obtained first-class record reproduction, of a volume enough to be useful for dance purposes.

Prolonged tests show that operation by the three control knobs is simple enough to enable non-technical listeners to get at least twenty stations at any time during a normal evening at loud-speaker strength.



### INGENIOUS DESIGN—AND EFFICIENT

This photograph shows how well arranged is the apparatus in the H.M.V. model 435 three-valve A.C. set

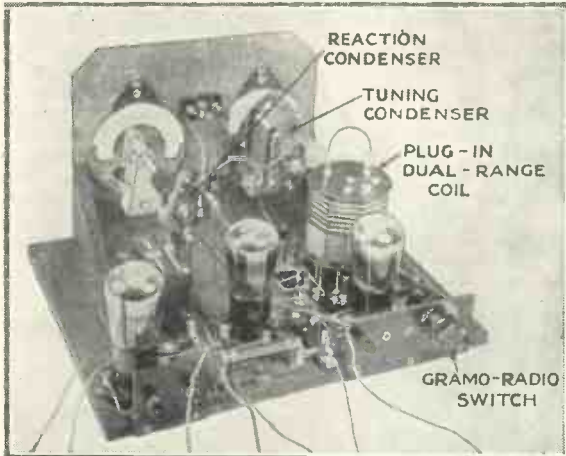


# Meteor Three (Kit Set)

WITH the great interest now being taken by broadcast listeners in the reception of the short-wave stations below 100 metres, a demand has arisen for adaptors for existing sets and for new sets with all-wave tuning ranges. To meet this demand the Meteor three-valve kit set has been designed, and it is marketed as a complete set of parts by Ready Radio, either in a console or standard cabinet.

within the capabilities of every amateur. The full-size plan and instruction sheet (price 1s.) gives all the details.

The three valves are mounted in a line at the back of the baseboard, and



COVERS ALL WAVELENGTHS

The Meteor Three covers short, medium and long waves, and can also be used for the electrical reproduction of records

The circuit of the Meteor Three comprises a straightforward detector and two low-frequency amplifiers, the first resistance-capacity coupled and the second transformer coupled. An advantage of this circuit is the ease with which the tuning range can be altered, as there is only one tuning circuit.

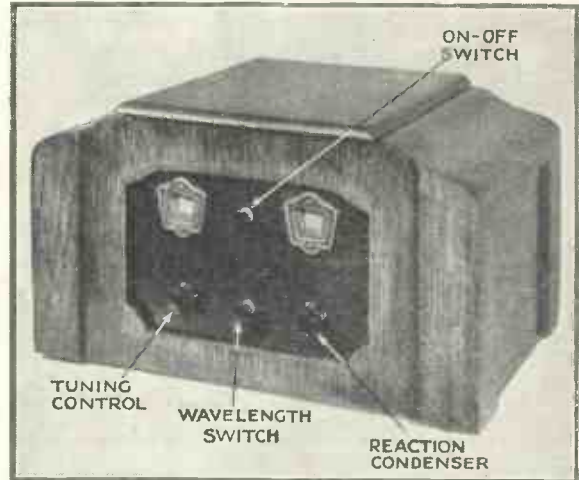
The disadvantage, namely lack of selectivity, is overcome in the Meteor Three by a careful design of the dual-range tuning coil in the detector circuit, low-loss windings being judiciously tapped to reduce the aerial load as much as possible without too much loss of signal strength.

## Plug-in Dual-range Coil

The dual-range coil is made on the plug-in principle, so as to be readily interchangeable with the special short-wave coil. These coils are tuned by a variable condenser having a maximum capacity of .00045 microfarad. This tunes the dual-range coil over all the normal medium and long wavelengths, and the short-wave coil from 19 to 50 metres.

Another point about the circuit—it is readily adapted to gramophone reproduction. Because of this the makers have fitted a gramo-radio switch, with a grid-bias plug, making the detector suitable as the first low-frequency amplifier of the three valves.

Although we have not been able to make up one of these sets, being supplied with a completely assembled model, we are sure the construction is



TWO CABINETS ARE AVAILABLE

Besides the cabinet shown here, a console type is also available for the Meteor Three, an all-wave receiver

the tuning and reaction condensers are fitted with the wave-change and on-off switches to the wood panel. The reaction condenser has an extension control, very useful in obtaining critical adjustments

These readings indicate that the coil spaces out the British stations very well. We found that both the London stations could be cut out within five degrees, with a further five degrees over which a very faint trace of the stations could be heard.

## Important Point

The important point is that the two locals are entirely separated and that we were able to get seven foreign stations at full loud-speaker strength. On the long waves Daventry and Radio Paris were both good.

Maximum signal strength was obtained with the No. 1 socket, and the No. 4 socket gave very little result. It has been included for those unfortunates living within a very few miles of a powerful regional centre.

We were particularly interested in trying our luck on the short waves, which we were able to do very easily by inserting the special short-wave coil in the place of the dual-range coil.

As soon as we got down to the short waves we were impressed with the capabilities of the Meteor set. At about 50 degrees we heard the American relay of WGY and, near by, Zeesen was extremely powerful.

## Easy Short-wave Tuning

The tuning is easy on the short waves if the dial is turned slowly, and reaction behaves extremely well. A good point about the short-wave coil is the use of a variable aerial coupling, consisting of a small aperiodic coil swinging on top of the main tuning winding.

Having satisfied ourselves that the Meteor three-valve kit works well on all the wavelengths covered, we connected up a pick-up to the terminals at the back. With an external volume control to limit the pick-up voltage applied to the PM2DX valve, we were able to obtain surprisingly good-quality reproduction from gramophone records.

on the ultra-short waves.

An economical batch of valves is used; detector Mullard PM2DX, second valve Mullard PM1LF, and output valve a Mullard PM2. These take only 8 milliamperes from a 120-volt high-tension battery, which is very economical working.

We liked the adaptability of the dual-range coil, which is provided with four alternative aerial taps. On the standard 60-ft. aerial the selectivity was above the average for a single circuit, and there was no appreciable loss of quality. With the aerial on the No. 2 socket we were able to get London National at 36 degrees, London Regional at 63 degrees, Midland Regional at 70 degrees, and North Regional at 85 degrees.

## SPECIFICATION IN BRIEF

MAKER: Ready Radio, Ltd.

PRICE: £3 15s. (kit without cabinet).

VALVE COMBINATION: Detector, resistance-capacity-coupled low-frequency amplifier, and a transformer-coupled power valve.

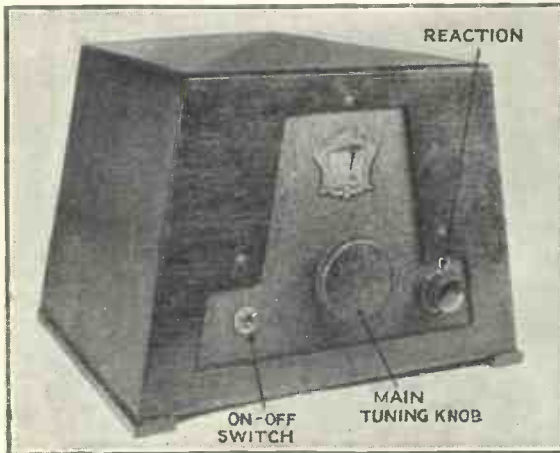
POWER SUPPLY: Batteries, externally connected in the standard cabinet model, or self-contained in the console cabinet.

POWER CONSUMPTION: Total anode current 8 milliamperes with 120-volt battery.

TYPE: Table-cabinet kit set, with all-wave tuning.

FINISH: The cabinets offered are extremely attractive, particularly the console.

# Eddystone Short-wave Converter



HANDSOME APPEARANCE

This photograph shows the neat appearance of the Eddystone short-wave converter for use with battery or mains receivers

QUITE a boom in short-wave reception has been created by the plans for the erection at Daventry of a special Empire short-wave station, and many home and overseas readers are asking for advice on suitable gear.

For the owner of a good broadcast receiver, that is one with a stage or two of high-frequency amplification, there is every inducement to go down to the ultra-short waves, that is, waves between say 15 and 100 metres. The particular inducement is that the existing set is, without any alteration, the major part of a short wave super-het.

To convert a broadcast set into a short-wave super-het involves no more than an efficient oscillator-detector valve, fitted with short-wave tuning and reaction, and having in its anode circuit a suitable coupling, which comprises a short-wave choke in series with a long-wave choke, and a small fixed condenser between the anode of the external oscillator valve and the aerial terminal.

## Completing Conversion

The conversion is completed by removing the aerial lead from the broadcast set and connecting it to the aerial terminal of the converter. Then the tuning of the broadcast set is adjusted to some convenient long wavelength and the subsequent operation is confined to turning the tuning and reaction knobs on the converter.

In this simple way a three-valve broadcast set becomes a four-valve short-wave super-het, with autodyne first detector, one intermediate long-wave amplifier, second detector, and output valve.

In addition to the great sensitivity of the arrangement, there is the advantage that the present set is not in any way altered.

The Eddystone unit shown by the photographs works on the super-het conversion principle just explained and works extremely well, as tests show. We should emphasise that the unit has a universal application to sets with one or more high-frequency amplifier valves, whether battery or mains operated.

With an A.C. mains set the self-contained batteries of the unit will be needed, but if the unit is to be connected to a battery-operated set there

As would be expected, the results on the short waves were extraordinarily good. It may seem like stretching the long bow, but it is a fact that the very first station to be heard was 2XAF, the 31-metre relay of WGY, Schenectady, New York. This was at 7 p.m. G.M.T., which corresponds to 2 p.m. Eastern Standard Time. The strength was so great that the amplification of the broadcast set had to be cut down. There was very little fading, and the delightful part about the operation was the absence of fiddling reaction.

## Uncritical Setting

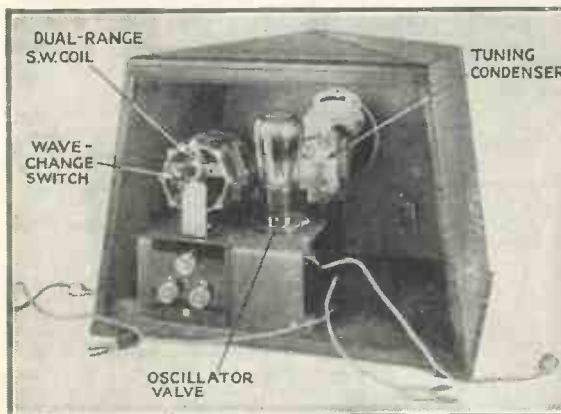
The actual setting for the unit oscillator condenser was found uncritical, and results did not appear to change much over a large segment of the dial.

Best results were obtained when the tuning of the broadcast set was adjusted to about 1,850 metres, but here again the setting was not critical, and almost equally good results were obtained at 1,600 and 2,000 metres.

For the reception of continuous wave stations—few of which will interest the broadcast listener—it is necessary to oscillate the broadcast set.

A final word about the power supply: some readers have asked us to recommend them to an A.C.-mains converter so that their present mains sets can be used on the short waves. While it is quite practicable to make such a converter, there is obviously a great duplication of power apparatus, which for a one-valver does not seem to be justified.

We think this little battery unit, so compact and efficient, will appeal just as much to the mains-set owner as to those



WELL DESIGNED AND ASSEMBLED

Like all Eddystone apparatus, this short-wave converter is well made and should give good service

is no point in duplicating the supply.

Like all Eddystone products, this unit is specially designed for short waves, as is clearly indicated by the metal-chassis construction, and the remote control of the tuning condenser.

A novelty is the inclusion of a dual-range short-wave coil with a switch let into the end. When this knob is pulled out the wavelength range covered by the coil is from 15 to 32 metres, and when the knob is pushed in the range is from 30 to 65 metres. All the most interesting short-wave transmissions are therefore covered, such as America on 32 metres and the amateur transmitters on 45 metres.

When we were testing out the unit for the first time we noted the neat fitting of the Pertrix 60-volt high-tension battery and Exide 2-volt accumulator in the compact cabinet. We connected up the leads and then used the unit in front of a four-valve commercial set having two high-frequency amplifying valves and working from A.C. mains. The self-contained power supply of the unit was, therefore, particularly appreciated.

with battery sets.

In our opinion, based on a considerable experience of the short waves and their peculiarities, this type of unit, when connected to a set of moderately good efficiency, is the most satisfactory means of exploring the waveband between 15 and 65 metres.

There is no trickiness in operation, and all that is needed to qualify for successful short-wave reception with the Eddystone unit is a working knowledge of operating a broadcast set.

## BRIEF SPECIFICATION

MAKER: Stratton & Co., Ltd.

PRICE: £4 17s. 6d. (includes the valve and the high- and low-tension batteries.) Without batteries the price is £4 5s.

VALVE COMBINATION: Oscillator-detector valve.

POWER SUPPLY: Self-contained batteries, or the batteries used with the set to which the converter is connected may be used.

POWER CONSUMPTION: 1 to 2 milliamperes current at 60 volts.

TYPE: Short-wave super-het adaptor.

FINISH: Attractive oak cabinet.

# Lotus Three-valve A.C. Set

AMONG the least expensive three-valve mains sets there is the Lotus model, which we recently tried out. As a result of our tests, which were done under ordinary household conditions, using a 60-ft. aerial some twenty miles south of Brookman's Park, we are now able to recommend this set, particularly on account of its good quality and general ease of installation and trouble-free maintenance.

Here we have another of the consoles

## THE SET IN BRIEF

**MAKER:** Lotus Radio, Ltd.

**PRICE:** 15 guineas.

**VALVE COMBINATION:** Screen-grid, detector, and super-power output.

**POWER SUPPLY:** A.C. mains. Standard model is for 200 to 250-volt supplies, 50 cycles. A special model is made for 100- to 110-volt mains, and for 25 cycles.

**POWER CONSUMPTION:** 40 watts.

**TYPE:** Table-cabinet console.

**FINISH:** Figured walnut cabinet, with attractive loud-speaker fret.

intended for table mounting, incorporating in a good-looking cabinet everything for the reception of home and foreign stations except the aerial, earth, and mains leads.

There is no provision for using the mains as an aerial, but, like most sets of its type, the Lotus will bring in a fair number of the more powerful stations with quite a small indoor aerial, though for maximum results it is best used with an outdoor aerial of, say, 70 to 80 ft. total length.

The circuit of the Lotus set is as straight as any we have recently come across. The three valves follow the inevitable sequence of high-frequency amplifier, detector, and power output. In the model examined, the first stage used a Mazda AC/SG, the detector was a Mazda AC/HL, and the power valve an Osram PX4. There is still another valve, for converting the A.C. into direct current for the anode supplies. This in the model tested was a Mazda UU60/250.

## Two Tuned Circuits

Only two tuned circuits are used, one for the aerial tuning and the other for the intervalve coupling. The two circuits are tuned by a two-gang condenser, and tests show that these circuits are well and truly matched.

Such a circuit lends itself to a simple layout, which has been admirably achieved in the Lotus metal chassis, which is as clean looking as anything yet seen.

We have no need to detail the controls, since these are clearly shown by the illustration. Referring to our tests, we found control very simple, but for the best

results it is necessary to understand the true function of the volume control, referred to by the makers as the selector.

The instruction booklet, to the makers' credit, clearly explains how the volume control must be decreased and reaction increased to get rid of local-station interference when searching for foreign stations.

From our notebook we see that the calibrations for medium and long waves proved to be very well done. And that the centre divisioning in degrees came in useful in logging stations between the wavelength markings.

General impressions gained from operation—smooth and easy to control reaction, effective control of volume, and clearly readable tuning scale. In other words, we were very satisfied with the operation.

Selectivity depends a great deal on the proper use of the selector knob. Used with discretion, this knob enabled the locals to be restricted to a moderate section of the dial.

London National had a spread of 18 degrees, corresponding to about 20 metres, which is very good. London Regional had a spread of 13 degrees, indicating better selectivity on the higher wavelengths, since normally both the locals come in at about similar strengths.

Foreign stations can be separated

from one another without much wangling of the controls. For a good example we quote the following from the log: Hilversum at 40 degrees, North National at 41.5 degrees, and Bordeaux at 42.5 degrees. All three stations were received clear of interference, which is really very satisfactory.

We have referred in the notebook to the quality as being "excellent." That is not fulsome praise, but mere justice. Using the H.M.V. playing desk, we were able to get first-class gramophone reproduction from the Lotus, due in some measure to the PX4 valve, which is an excellent example of the super-power class.

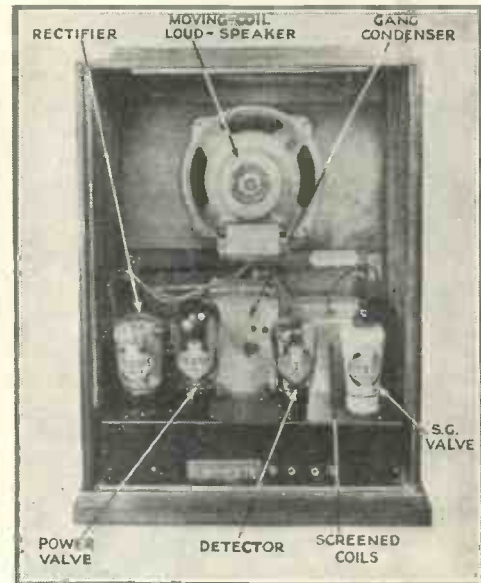
## Rich Bass

This works into the Magnavox moving-coil loud-speaker very well, resulting in a rich, but not boomy, bass, and enough treble to satisfy most listeners. Certainly we were more than satisfied with the overall tone.

If it is desired to make use of the Lotus set as a gramophone amplifier an external volume control must be fitted across the pick-up, otherwise, if it is a very sensitive model, the first valve will be overloaded. The volume control should have a resistance of about 250,000 ohms.

Those on awkward supplies should note that a special model of the Lotus set has been designed for 100- to 110-volt mains, and for 25-cycle periodicities.

The set is designed for operation on A.C. mains only—there is no D.C. model.



## CLEAN CHASSIS ASSEMBLY

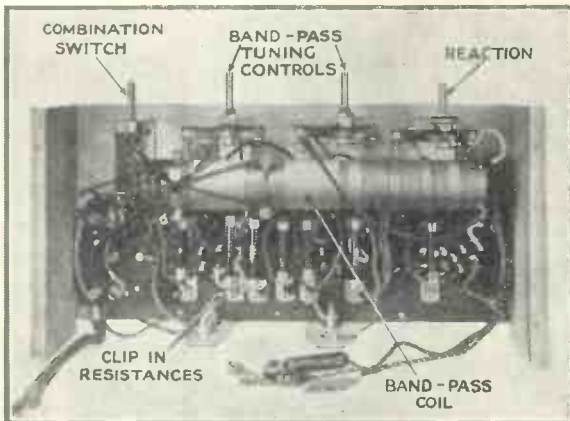
Particularly neat is the internal arrangement of the Lotus three-valve set, which employs a valve mains rectifier



## COMPLETELY SELF-CONTAINED

As this photograph shows, the Lotus three-valve A.C. set is particularly handsome in appearance

# Zonophone Three-valve Kit Set



UNDERSIDE OF THE METAL CHASSIS

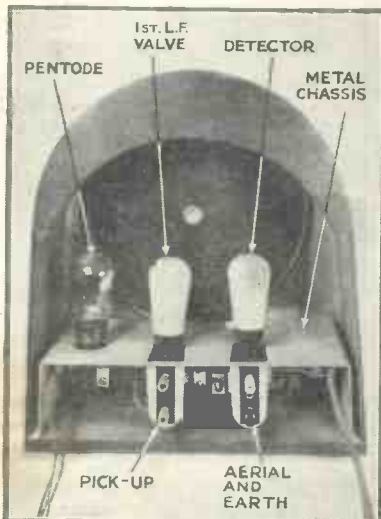
This photograph shows the businesslike assembly of the Zonophone three-valve kit set

THIS three-valve kit set differs from the usual in having a self-contained cone loud-speaker, which the constructor makes as the final stage of the assembly.

Another claim to distinction lies in the method of assembly, which follows the mass-production plan. More explicitly we should say that the assembly is based upon the fixing and wiring of a metal chassis, with the valve holders let into the top and the wiring carried out beneath.

## Colour-code Wiring

We were supplied with a kit of parts, so our tests consisted of assembly and then actually using the set. The instructions for the preliminary work need careful reading, as there are rather a lot of cross-references. But once the colour-code system of wiring is understood, there is no particular difficulty



BACK OF THE SET

Another photograph showing the back of the Zonophone kit set, complete with cone loud-speaker

in getting down to the interesting job of construction.

There are several packets of parts, and the constructor is told when to undo each. This saves a lot of confusion. The first stage is the fixing of the resistance clips and the fixed condensers on the insulated valve deck.

As the wiring is not a separate stage, these parts are next wired together in accordance with the colour code, the infallibility of

which more than compensates for any initial puzzlement.

The assembled and wired valve deck is next mounted under the metal chassis, to which are also fitted the three variable condensers, two for tuning and one for reaction, and the wave-change switch.

Then the connecting cable is fitted and wired to the components. Follows the fixing and wiring of the long band-pass coil. Finally the cone loud-speaker is assembled, fitted, and wired.

## CHIEF POINTS OF THE SET

MAKER: British Zonophone Co., Ltd.

PRICE: 6 guineas.

VALVE COMBINATION: Detector and two resistance-coupled low-frequency amplifying stages.

POWER SUPPLY: Externally-connected batteries.

POWER CONSUMPTION: 10 milliamperes with a 120-volt high-tension supply.

TYPE: Novel type of kit set housed in cabinet with cone loud-speaker.

FINISH: Compact walnut cabinet.

Thus, in a few simple stages a complete three-valve console set can be assembled.

The circuit is unusual. The first of the three valves is the detector, followed by two stages of resistance-capacity-coupled low-frequency amplification, with a pentode output valve. Selectivity is maintained in spite of the simplicity of the circuit by using an aerial band-pass tuner, with two separate tuning condensers.

A very sensitive batch of valves is used. The detector is a Marconi H2, the first low-frequency valve is a Marconi HL2, and the pentode is a Marconi PT240, giving good results with the self-contained loud-speaker, whose winding is specially matched.

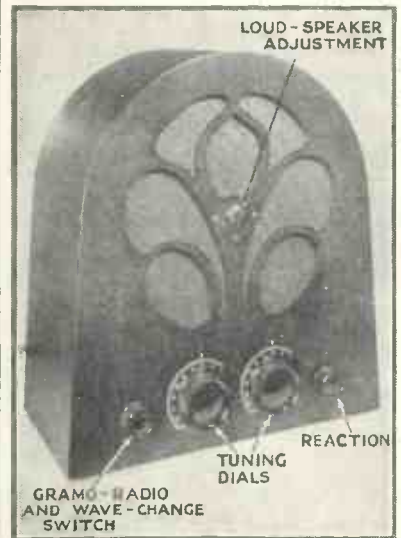
Tests of the completed kit showed that the circuit as incorporated in the metal-chassis assembly is quite capable of meeting average reception requirements.

Although there are two tuning controls, these were found to keep "in step" over most of the medium- and long-wave ranges. And the selectivity of the tuning is very much above the average of detector low-frequency sets.

## Pleasing Reproduction

The reproduction from the two London stations was pleasing, the self-contained cone loud-speaker counteracting any high-pitched tendency of the pentode. Average volume can be handled without distortion, but care must be taken not to push the reaction too far.

The band-pass action of the tuning enabled us to restrict the two locals to



NEAT APPEARANCE

The Zonophone three-valve set is particularly neat in appearance

a few degrees of their maximum tuning points on the 0-to-180 degree dials.

With a normal aerial, say, 70 to 80 ft., selectivity is really good, and the use of such an aerial enables a dozen or so of the more important foreign stations to be tuned in at fair loud-speaker strength.

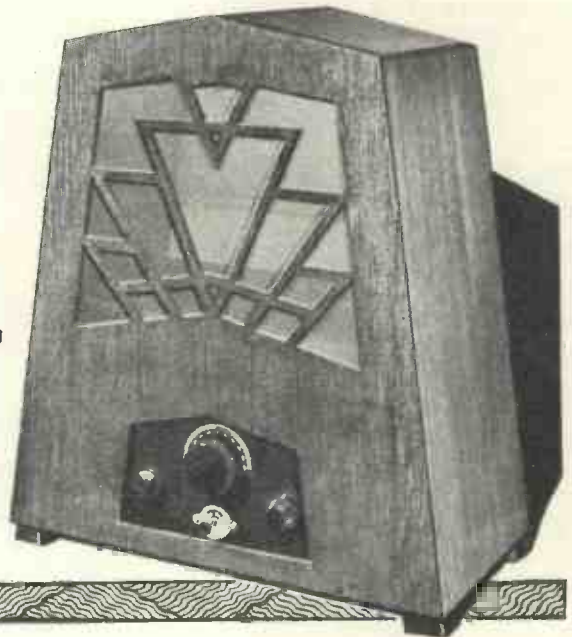
## Terminal Arrangement

There are two aerial terminals, one giving a series aerial condenser for extra long aeriels. Two other important terminals on the back of the chassis are for the connection of a pick-up. As far as any battery-operated set is suitable for gramophone-record reproduction, the Zonophone kit can be recommended. Its low-frequency arrangement lends itself to use with a pick-up.

We used the set with the new Zonophone pick-up, and at moderate volume obtained excellent results.

# The NEW PLUG-IN COIL THREE

In April last we published details of a set called the Plug-in Coil Three, which has enjoyed considerable popularity. Here the "Wireless Magazine" Technical Staff give full particulars of another and more up-to-date design for a gramo-radio set using two-pin plug-in coils.



ONE of the most interesting facts about modern radio is the popularity still enjoyed by the two-pin plug-in type of tuning coil. In spite of the large number of dual-range tuners now available, there is a very large demand for the old type of plug-in coil.

### Up-to-date Design

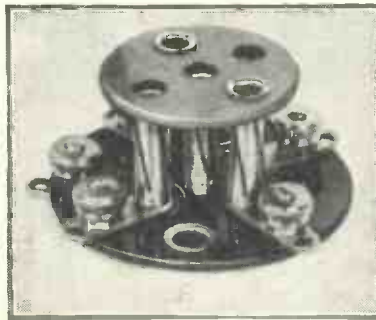
Here are details of an up-to-date design using this type of tuner. The set comprises a leaky-grid detector, followed by two transformer-coupled low-frequency stages. A switch is provided for changing from medium to long wavelengths without changing coils—so in this respect the set is as convenient as one employing a dual-range tuner.

An additional point of interest is the inclusion of a switch to put an electromagnetic pick-up in circuit when it is desired to reproduce gramophone records electrically. By this means the pick-up can be kept permanently connected to the set and brought into use with the greatest convenience.

### Greatest Utility

The whole idea behind the design of this set, which is, of course, the work of the "Wireless Magazine" Technical Staff, is to get the greatest utility out of two-pin plug-in coils. That this object has been achieved will be evident from a glance at the arrangement of the controls on the front panel.

On the left is the wave-change switch. This is of the self-indicating type—that is, when the knob is pulled



LOW-LOSS VALVE HOLDER

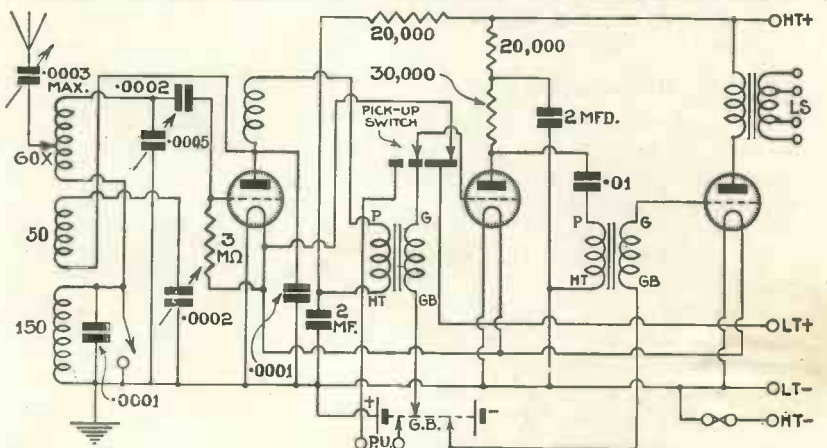
The *Clix* valve holders used in the New Plug-in Coil Three are of the low-loss type, as this photograph shows

out the word "Short" appears, while when it is pushed in the indication "Long" becomes visible. This makes the set very simple to operate and any member of the family can therefore tune-in without difficulty.

The large dial in the centre of the panel is the main tuning control.

### Three-position Switch

Under the main dial is another switch, which performs three functions. It is of the push-pull variety. When the knob is right in, the indication "Off" appears in the opening. At the half-way position the set is switched on for radio reproduction, and when it is pulled right out the word "Gramo" appears



STRAIGHTFORWARD CIRCUIT THAT GIVES GREAT PUNCH

The combination consists of a leaky-grid detector followed by two transformer-coupled low-frequency stages. The fixed condenser across the long-wave coil is optional

# THE NEW PLUG-IN COIL THREE—Continued

## COMPONENTS NEEDED FOR THE NEW PLUG-IN COIL THREE

### CHOKE, HIGH-FREQUENCY

- 1—Readi-Rad, 4s. 6d. (or Varley, Peto-Scott).

### COILS

- 1—Igranic No. 50 plug-in, 2s. 3d. (or Tunewell, Atlas).
- 1—Igranic No. 60 plug-in, double-tapped, 3s. 9d. (or Tunewell, Atlas).
- 1—Igranic No. 150 plug-in, 2s. 6d. (or Tunewell, Atlas).
- 1—Set Igranic short-wave plug-in, Nos. 2, 4, 6, and 9, 11s. 6d. (or Atlas, Eddystone).

### CONDENSERS, FIXED

- 1—Dubilier .001-microfarad, type 670, 1s. (or T.C.C., Telsen).
- 1—Dubilier .001-microfarad, type 620, 1s. 8d. (or T.C.C., Telsen).
- 1—Dubilier .002-microfarad, type 620, 1s. 8d. (or T.C.C., Telsen).
- 1—Dubilier .01-microfarad, type 620, 3s. (or T.C.C., Telsen).
- 2—Dubilier 2-microfarad, type BB, 7s. (or T.C.C., Telsen).

### CONDENSERS, VARIABLE

- 1—J.B. .0005-microfarad, type Tiny No. 2, with slow-motion dial, 8s. 6d. (or Formo, Ormond).
- 1—Readi-Rad .0002-microfarad bakelite reaction, 3s. 6d. (or Telsen, Dubilier).
- 1—Sovereign preset .0003-microfarad maximum, 1s. 3d. (or Formo, R.I.).

### EBONITE

- 1—Becol 9-in. by 8-in. panel, 2s. 5d. (or Permcot, Red Triangle).
- 3—Sovereign terminal blocks, 1s. 6d. (or Belling-Lee, Junit).

### HOLDERS, COIL

- 3—Igranic two-pin, 3s. (or Lotus).

### HOLDERS, VALVE

- 3—Clix, with terminals, 2s. 6d. (or W.B., Wearite).

### PLUGS AND TERMINALS

- 6—Ealex terminals, marked: Aerial, Earth, L.S.+ , L.S.—, Pick-up (2), 2s. 3d. (or Belling-Lee, Clix).
- 7—Ealex wander plugs, marked: G.B.+ , G.B.—1, G.B.—2, G.B.—3, H.T.—, H.T.+ , one plain, 1s. 2d. (or Belling-Lee, Clix).
- 2—Ealex spade terminals, marked: L.T.+ , L.T.—, 4d. (or Belling-Lee, Clix).

The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower

### RESISTANCES, FIXED

- 2—Magnum 20,000-ohm, flexible type, 3s. (or Lewcos, Sovereign).
- 1—Magnum 30,000-ohm, flexible type, 1s. 6d. (or Lewcos, Sovereign).
- 1—Telsen 3-megohm grid leak, 9d. (or Watmel, Dubilier).

### SUNDRIES

- Tinned copper wire for connecting (Lewcos).
- Lengths of oiled-cotton sleeving (Lewcos).
- 1—Pair Bulgin grid-bias battery clips, type No. 1, 6d.
- 1—Readi-Rad fuse holder and bulb, 1s. 3d. (or Belling-Lee).
- Length of rubber-covered wire (Lewcos).

### SWITCHES

- 1—Gripso two-point indicating, marked "Long" and "Short," type S1, 1s. 6d.
- 1—Gripso five-point indicating, marked "Gramo," "Radio," and "Off," type S4, 2s. 9d.

### TRANSFORMERS, LOW-FREQUENCY

- 1—Igranic Midget, ratio 1 to 3, 10s. 6d. (or Telsen Ace, R.I. Hypermite).
- 1—Igranic Midget, ratio 1 to 5, 10s. 6d. (or Telsen Ace, R.I. Hypermite).

### TRANSFORMER, OUTPUT

- 1—British General multi-ratio, 9s. 6d. (or Ferranti, Telsen).

### ACCESSORIES

#### BATTERIES

- 1—Full O'Power 120-volt, type H3, 13s. 6d. (or Drydex, Pertrix).
- 1—Full O'Power 9-volt grid-bias, 1s. 3d. (or Drydex, Pertrix).
- 1—C.A.V., 2-volt accumulator, type 2AG7, 10s. 6d. (or Siemens, Pertrix).

#### CABINET

- 1—Peto-Scott console, £1 15s. (or Pickett, Osborn).

#### LOUD-SPEAKER

- 1—Blue Spot, 66K, with special chassis, £1 12s. 6d. (or Ormond, Squire).

#### VALVES

- 1—Cossor 210Det, 8s. 6d. (or Mazda HL2, Mullard PM1HL).
- 1—Cossor 210LF, 8s. 6d. (or Mazda L210, Mullard PM1LF).
- 1—Cossor 220P, 10s. 6d. (or Mazda P220, Mullard PM2).

#### MAINS UNIT (in place of high-tension battery)

- Atlas A.C. 244, £2 19s. 6d. (or Regentone, Tannoy).

output transformer. This enables the best results to be obtained with any combination of power valve and loud-speaker.

It is well known that for the best results the impedances of these two parts must be matched. With the transformer included in the set, five different ratios can be obtained, suitable for matching any standard three-electrode power valve or a pentode to a high-resistance loud-speaker.



**GOOD VALVES ARE NEEDED**  
For a set of the type of the New Plug-in Coil Three, efficient valves are necessary if the best results are to be obtained

and the set is automatically adjusted for the reproduction of gramophone records.

These are features that will appeal to many hundreds of constructors and there is no doubt that many existing plug-in coils sets will be converted into this new design.

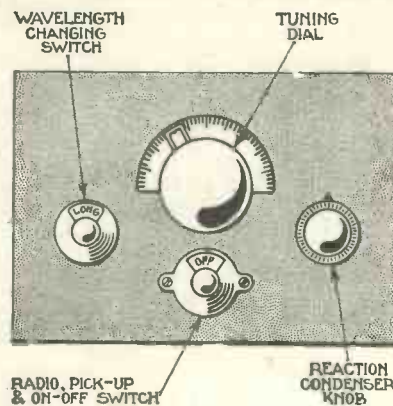
### Refinements

Although the circuit is straightforward, as will be seen from the diagram on page 45, there are one or two refinements that will appeal to the more particular constructor.

In the first place the second transformer is arranged on the parallel-feed system, recently discussed in these pages by the Technical Editor. The advantage of this system here is that a small transformer can be used with a low-frequency amplifying valve that takes a fairly large anode current and there will be no saturation of the core.

Consequently the amplification is retained at a high figure and the quality of reproduction is also good.

The second feature of particular interest is the inclusion of a tapped



**FRONT OF THE SET**

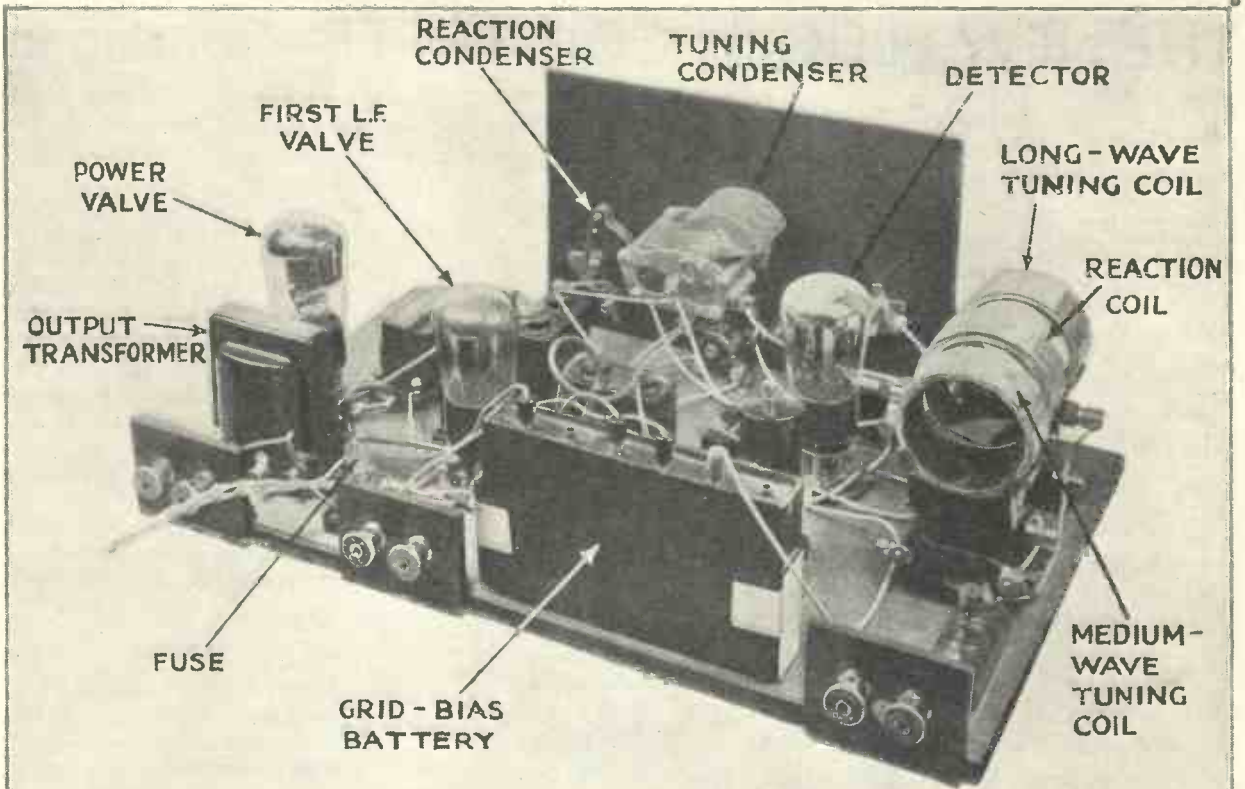
This diagram shows clearly how the controls are arranged on the front panel of the New Plug-in Coil Three

Three coils only are used. There is a medium-wave aerial coil, a long-wave aerial coil and a common reaction coil, which is placed between the two aerial coils.

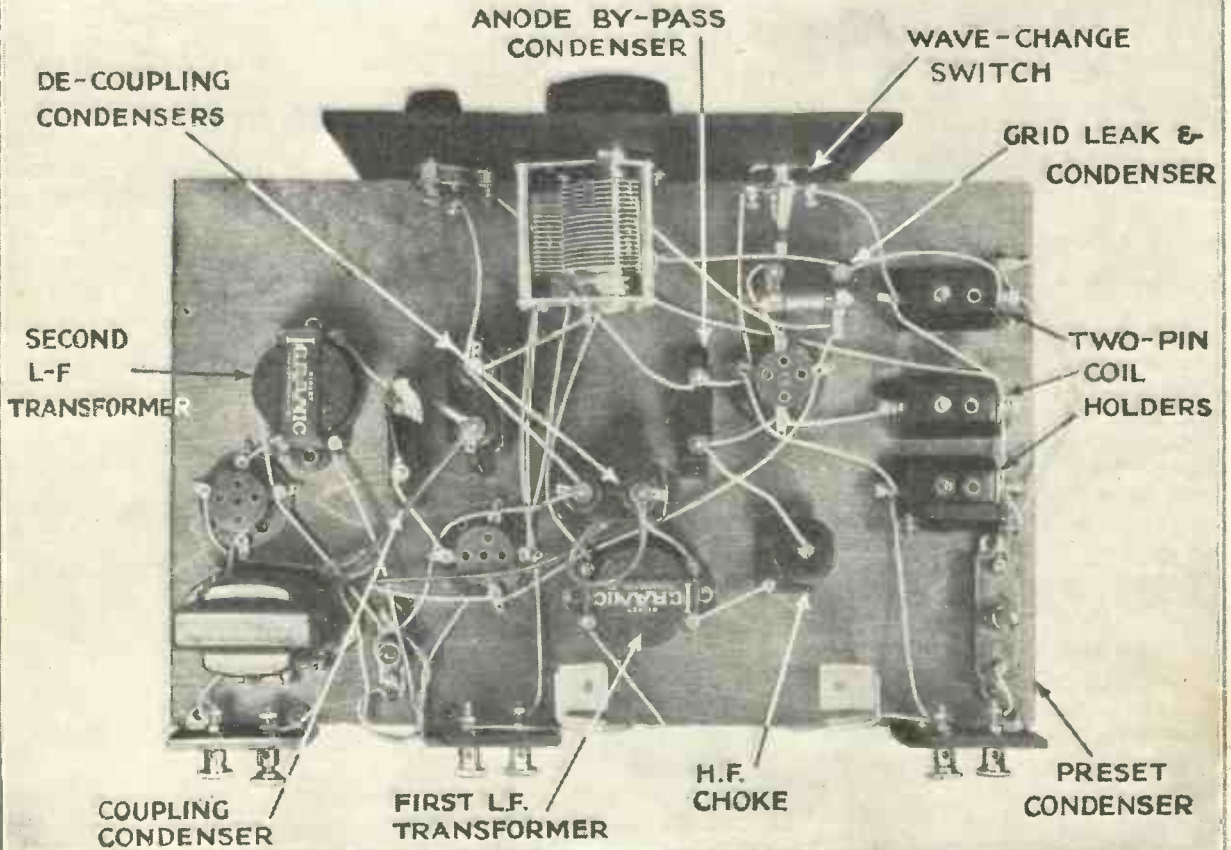
### Short-wave Reception

If desired, short-wave coils can be inserted for the reception of the ultra-short-wave stations. For this purpose, the ordinary medium- and long-wave coils should be removed from their holders and the short-wave coils inserted instead. By means of the wave-change switch the set can be adjusted for reception on two different short-wave bands.

It will be clear from the photographs and diagrams reproduced in these pages that the receiver is quite simple to construct.



Here you see the New Plug-in Coil Three all ready for use with the valves and coils in position. A single switch gives on-off, radio and gramophone control—an ideal arrangement for family use



This plan view of the New Plug-in Coil Three shows how simple is the disposition of the parts. The construction is well within the capabilities of any beginner, especially if use is made of a full-size blueprint





# A SET WITH TWO-PIN PLUG-IN COILS

the lower the signal strength. The capacity should therefore be as great as possible consistent with sufficient separation between the local stations.

## Second Method

A second method of increasing the selectivity is to tap the tuning coil. This again results in loss of signal strength. In practice a coil with two tapings is used and when the set is in operation these tapings should be tried in turn until the best results are obtained.

A frequent cause of interference is the breaking through of medium-wave stations when the set is adjusted for long-wave working. By raising the minimum long wavelength to which the set can be adjusted this

effect can be avoided to some extent. That is the reason for the inclusion of a .0001 microfarad fixed condenser across the long-wave coil in the New Plug-in Coil Three. It helps to prevent the breaking through of medium-wave signals, but if this trouble is not experienced then the condenser can be omitted.

If the constructor prefers, this condenser can be omitted in the first place and be inserted later if any trouble is experienced.

From these remarks it will be gathered that the New Plug-in Coil Three is not recommended for use very close to a broadcasting station. It will be quite suitable, however, for readers who live in the country some distance from a broadcasting station.

Listeners who have old sets with two-pin plug-in coils will know how selective such tuners are in their particular districts and they will have no hesitation about converting to the New Plug-in Coil Three.

## Past Experience

If it has been found in the past that plug-in coils are not sufficiently selective to give good results it is not suggested that the receiver is the ideal set to build. When selectivity is a difficult problem it is a much better proposition to use a set with at least two tuned circuits.

But for those who want to use two-pin plug-in coils, the New Plug-in Coil Three will do all that can be desired—which is saying a lot.

## Three Ways of Finding Polarity

**METHODS** of determining polarity by the chemical effect of an electric current are well known. I think, however, it may be of interest to describe an even simpler magnetic test, which does not appear to be so largely known as might be anticipated.

Furthermore, this test does not necessitate the breaking of the circuit, except by a switch or plug,

the direction of the thumb, the current in the circuit is flowing in the direction in which the fingers are pointing. Should the deflection be the other way and away from the thumb, the current is flowing in the reverse direction.

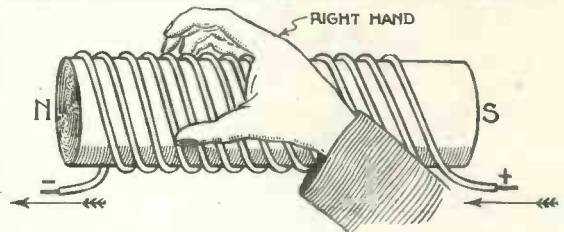


Fig. 2.—Testing the polarity of a solenoid

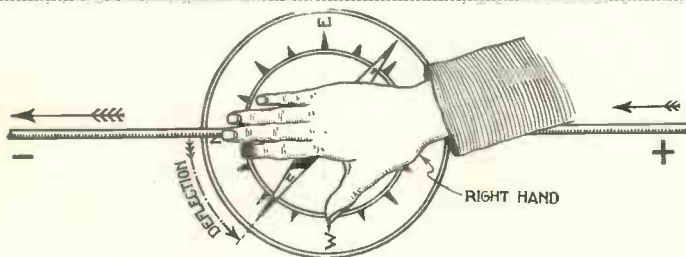


Fig. 1.—Finding polarity of wire forming part of a complete circuit

necessary to remember that the circuit wire must come between the compass and the right hand.

This magnetic polarity test is, I think, the safest, surest and simplest to apply. It only requires an inexpensive pocket compass and the use of a small dry battery.

**Method 2.**—A similar magnetic test on the polarity of a coil or solenoid is carried out in a similar way (Fig. 2), so that if the fingers are passing round the coil in the direction the current is flowing, then the polarity is at once determined by the thumb pointing to the north seeking end of the solenoid.

**Method 3.**—A further use may be made of the small pocket compass by constructing a detachable coil (Fig. 3) into which the compass will just fit and, if this coil be wound with a number of fine turns of wire, connected to two terminals, as shown, the combination will make a useful detector or galvanometer.

L. M. WATERHOUSE.

and only requires a simple and inexpensive pocket compass to carry out.

**Method 1.**—If a wire forming part of a circuit (Fig. 1) is placed directly over a compass so that it is parallel with the needle and the right hand, with the thumb extended, is placed over the circuit wire, so that the fingers are in line with the wire itself in either direction, then, on making the circuit—if the north-seeking end of the compass needle deflects, or tends to deflect, in

In carrying out this test it is only

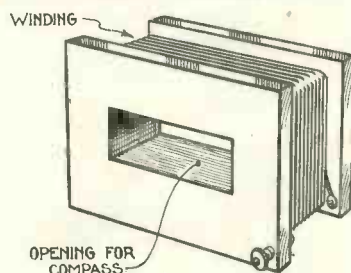
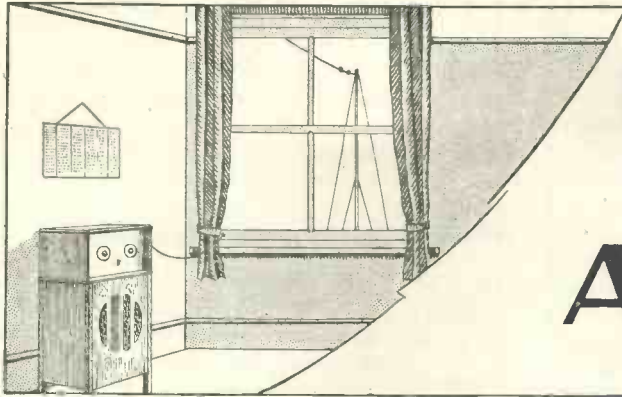


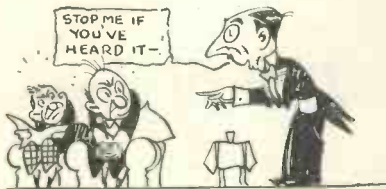
Fig. 3.—Detachable coil for use with a pocket compass



# UNDER my AERIAL

## Savoy Hill

**B**Y the time you read these notes the last straggling remnants of the B.B.C. staff will probably have left Savoy Hill for Broadcasting



Our recollections as listeners

House, and Savoy Hill will therefore be closed to broadcasting for ever.

No doubt many of the older members of the London staff of the B.B.C. will feel a pang or two of regret on leaving Savoy Hill, because of their old and pleasant associations.

What will our recollections, as listeners, be of Savoy Hill? Those of us who are oldest in point of listening age will never forget that first, and perhaps most famous of all announcers, Uncle Arthur, now of Geneva. Wireless children of the early years of Savoy Hill will perhaps remember Uncle Caractacus best.

The less serious amongst us will retain vivid recollections of John Henry and his "Hello! everybody," and perhaps will wonder whether John Henry will ever repeat at Broadcasting House his successes of early Savoy Hill days.

Those of us who count music as the best thing in broadcasting will doubtless always connect Savoy Hill with the Savoy Band, De Groot and Sandler.

Yes, Savoy Hill has earned a permanent place in the history of broadcasting, and somehow or other I think the achievements at Savoy Hill will not be lost entirely because of the modern magnificence and splendour of Broadcasting House.

## Buy British

How is this excellent slogan "Buy British" going to affect wireless? I have the idea that it cannot have very much effect for the very good reason that we wireless folk have long been setting the example to others by buying British goods and British goods only.

Look through your set and see if you have any foreign components in it. My general-utility three-valve set does not contain one single foreign component. Valves, coils, grid leak, condensers, transformers, loud-speaker, batteries, accumulators and wire are all British to the last degree.

In my spare apparatus the only things I have of foreign origin are two large fixed condensers. I bought these particular condensers because of their high voltage safety factor. A week after I had bought them, I found I could have bought British condensers of the same high voltage safety factor.

There have been times when we have seen our wireless shops flooded with cheap components of Continental origin, but our British manufacturers have long since beaten all Continental manufacturers in the production of cheap components, and the present low-price era is entirely due to British manufacturers.

We have much to be thankful for regarding our British wireless goods. British valves have long since been recognised as the best in the world. I think the time is not far distant



The only things I have of foreign origin

when British sets, British loud-speakers, and many British components will have reputations equal to that of British valves.

## The New Valve

Have you bought one of the new "variable-mu" valves yet? According to the prevailing idea, any of us who are found using the familiar screen-grid valve in a few months from now will be looked upon as being dreadfully old-fashioned as far as high-frequency amplification goes.

Isn't it amazing how things come and go in wireless? Not many years ago we were all using the ordinary three-electrode valve with neutralised



Things come and go in wireless

circuits for high-frequency amplification. The screen-grid valve appeared, and before we knew where we were almost the neutralised circuit had become a thing of the past.

Now, apparently, it is the turn of the screen-grid valve to go, pushed out by the variable-mu valve in much the same way as the screen-grid valve itself pushed out the neutralised triode.

Well! that is the position, and I wonder what we shall have to do about it. To me it is a serious matter, for I have no less than three pairs of screen-grid valves of different makes in the house at the moment. I do not like the idea of having to scrap six pounds' worth of valves.

Yet I suppose I shall have to move with the times and try the new variable-mu valve. As George says, it wouldn't be wireless if we hadn't a decent-sized junk heap with a few obsolete valves at the top of it.

Five—Four—Three

"George, I had an amusing talk with a wireless relative of mine this morning. What do you think he told me?" There was no reply from my technical adviser so I looked more closely at him, and I saw he



It stopped at three

was nodding gently in his armchair. "George," I called loudly.

"Er—I'm afraid I was dozing," said George. "Funny how I get sleepy these nights just about the time of the second news bulletin. Anything important?"

"I was saying, George, that I had an amusing talk with a wireless relative of mine this morning. He told me how he had started wireless with a five-valve set which was not at all satisfactory—"

"So a wireless friend of his came along and reduced it to a four-valve set and it worked well ever after."

"How do you know that, George?"

"You've told me this tale before."

"No, I have not, George. That was another wireless relative of mine. This is quite a different one. He did have his set reduced from five valves to four, but even then it was not to his liking, it was still too complicated. So he got a new wireless acquaintance, who was very keen, to have a go at it."

"And he reduced it to a three-valve set. Even then—"

"No, George, it stopped at three. What do you think my wireless relative told me, though, this morning?"

"Being a relative of yours, of course, and allowing for the wireless—"

"He told me, George, that there were no coils of any kind in his re-arranged three-valve set."

"Must have had one of those tuning units in it."

"So I thought, George. He seems

to be well pleased with his three-valve set as it is now."

"Pity."

"Why, George?"

"Oh, well! if he had gone on with his reduction treatment, there might have been a loud-speaker coming to one of us cheap."

Light Telephony

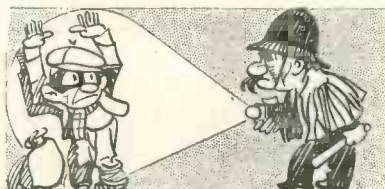
Don't you think it is a somewhat remarkable thing that, if experimenters keep on going down further and further on the wavelength scale, they will ultimately find themselves back at the very starting point of wave telephony, namely telephony along a beam of light?

Yet it is so. The first successful attempt at beam telephony was the photophone of Alexander Graham Bell.

In this apparatus the famous Scottish scientist transmitted articulate speech over a considerable distance by the simple agency of a beam of light.

Of course, it is a fair step down from a wavelength which can be expressed in centimetres, say, to a light wavelength of one fifty-thousandth of an inch, but these light waves of so minute a size are electromagnetic waves just as are wireless waves.

Quite a number of American experimenters have successfully reproduced Bell's original photophone during the last year or two, and have transmitted both speech and music over short distances by using a beam of light as the carrier. No doubt the same kind of thing has been done by scientists on our side of the Atlantic.



The simple agency of a beam of light

For my own part, I have been wondering whether the selenium cell can be used in this newly revived form of light-beam telephony.

There is now a very cheap form of selenium cell available in this country. I have just purchased one myself, but I have not yet had time to carry out experiments with it.



Getting me off the long way

Reception Points

What are the chief points about your reception just now? Are you getting better reception on the long waves than on the medium waves? Which is to you the most improved broadcasting station this winter?

I find things most interesting at the present time, and there are several points on which I should like to exchange notes with you.

For example, have you found Radio Paris very much improved since the increase of power took place at that station, or have you found that the increase of power has made very little difference, and that the Eiffel Tower transmission still comes through rather better than the Radio Paris transmission?

For the last few weeks I have found reception on the long waves unusually good for me, and I have thoroughly enjoyed the Oslo, Kalundborg and Warsaw transmissions. Reception on the medium waves has also been pretty good, but I cannot just think of any outstanding stations.

If I could spend half an hour with you discussing conditions as they have been the last month, I believe you would have some difficulty in getting me off the long waves, and if you could spend half an hour with me and my three-valve set, you would hear very little of the medium-wave stations.

Were a vote to be taken on the most improved broadcasting station this winter, I really think I should give my vote to a long-wave station—Warsaw probably. To which station would you give your vote?

Eloquent Figures

The official figures which give the number of wireless licences per hundred of the population for each of the counties of England, Scotland, and Wales are extremely interesting. Have you seen these figures? Where does your county come in this order of wireless merit?

In the London area there are fifteen wireless licences per hundred of the

## UNDER MY AERIAL—Continued



Middlesex listeners take out their licences

population. In Hertfordshire the figure is the same, and for all the counties round about London the figure is ten or over, except for Middlesex, and the figure for this county is only four per cent.

I have puzzled a good deal over this Middlesex figure. I know that county well and its low figure in the matter of licences is so surprising that I wonder if a mistake has been made somewhere. Can any of our Middlesex readers give an explanation? It can hardly be that Middlesex listeners take out their licences when they are in business in London. Such an explanation would apply to each of the other Home Counties.

Cumberland is one of the distant counties whose conditions I know from experience, and its licence figure of five per cent. of its population is perhaps a little higher than might have been expected.

Durham has the surprisingly low figure of three. Why should this be when Northumberland to the north and Yorkshire to the south each have a figure of eight licences per hundred of the population?

But I must stop. I could go on for a long time asking questions about these interesting county figures. Study the figures for yourself and I am sure that you will find them as interesting as I have found them.

### Short Waves

If there is one tip I would give you just now above all others regarding short-wave work, it is this: Don't start short-wave reception when atmospheric or etheric conditions for short waves are bad.

I say this because of the very disappointing time I have had over my own short-wave work this winter. Certainly I knew that conditions for short-wave reception were at their worst, but I persisted and persisted night after night and the result was almost complete failure.

Short-wave work is fairly easy when conditions are good, but

when conditions are bad, such work can be most exasperating. I was trying to calibrate certain short-wave coils of my own winding. I picked up plenty of morse, but I could get very little telephony, and therefore I was unable to obtain the requisite number of wavelength identifications.

One whole morning spent in short-wave work resulted in a bag of four stations, two French stations and two English. The English stations were amateur stations, one in Nottingham and the other at Newport in the Isle of Wight. This latter, to my great delight, gave his frequency in very clear speech.

That same afternoon I listened to a short-wave station for over two



Such work can be most exasperating

hours without identifying it. Speech followed speech in some foreign language, a man and a woman speaking alternately. No doubt it was a Russian station, but I was unable to get a precise identification and so determine the wavelength.

Short-wave work is very fascinating, but it is erratic at times, and I think we should be badly off if we had to depend entirely on short-wave broadcasting as do some of our colonists in the more distant parts of Britain Overseas.



Stopped by non-wireless friends

### Set Choosing

With the large number of improved sets on the market, it is more difficult than ever to deal with the non-wireless friend who comes to you and tells you he has decided to buy one and then proceeds to ask you which. Twice this last week I have been stopped by non-wireless friends and have had this very difficult question put to me.

I never can make a direct reply when I am asked to recommend which set a beginner ought to buy. I always hedge by asking what particular set or type of set the would-be buyer has in mind.

Very often I can remember having seen a description of the particular set or of something near to it in "Wireless Magazine" or in *Amateur Wireless*, and I suggest to the would-be buyer that he should read that description. Next, I suggest that he should try to hear the set at a wireless shop and buy it if he really likes it.

Speaking generally, the best advice that you can give to the newcomer is that he should buy a set suitable to his purse and his ear. I put purse first in these days of economy, but I think I should put ear first in more prosperous times.

## THE WIRELESS ZOO

### THE FAN-TAIL

*The Wireless Fan-tail pigeon coos—  
When other birds desire to snooze—  
Of Volt, Anode and Battery,  
Magnetic Flux and D. C. C.  
'Tis useless for his friends to say  
"What was the score at close of play?"  
He drags the conversation back  
To Open Circuits and Shellac;  
Till they in utter boredom sigh  
And darkly talk of pigeon pie!*

LESLIE M. OYLER

# The Variable-mu Valve

This authoritative article by F. E. HENDERSON, A.M.I.E.E., will clear up for many readers obscure points about the new "variable-mu" screen-grid valve, which is undoubtedly one of the most important developments of recent years. These notes answer the question "Why and how does it work?"

A GREAT deal of attention is being directed at the present time to the advent in this country of a new type of screen-grid valve commonly known as the "variable-mu" and questions have been asked as to what is the necessity for this valve, what actually does it do in the receiving set, and why does it do it?

## What "Mu" Means

In the first place the suffix "mu" is possibly slightly misleading as in this country in technical circles "mu" is often taken to represent the "amplification factor" of a valve. Actually in this new type of screen-grid valve "mu" means "mutual

In an ordinary screen-grid valve, for example, either a reduction in screen voltage or increase in grid bias will materially reduce the mutual conductance. Why, then, do we need to have another new valve added to the already long list of types available in this country?

The reason really lies with the present state of broadcast conditions in Europe. Practically all listeners have experienced during the past year or so a marked change in the type of reception. For instance, stations which were weak are now coming in at loud-speaker strength on even the simplest set and in many cases there is the trouble that the

local station of a year or so ago is now coming in at a volume which is extremely difficult to control.

It is this problem of control of loud volume which is the root cause of the introduction of the "variable - mu" type of screen-grid valve. It is easy to control volume, but not so easy to control it without introducing distortion.

Various methods of volume control are commonly employed, such as a variable aerial condenser,

a potentiometer input to the set, a shunt resistance across the aerial coil, or, if the screen-grid valves are used, variation in the filament voltage for battery valves, variation in screen-grid voltage, and lastly, variation to grid bias.

With ordinary valves practically all these methods have their dis-



NEW OSRAM TYPE

It will be seen from this photograph that the Osram VMS4 variable-mu valve looks similar to an ordinary screen-grid type

advantages. For example, a variable input control maintains the valve working at its maximum condition all the time and is thus liable to introduction of valve noises.

## Control of A.C. Valves

Filament control is impracticable in an A.C. valve; variation in screen-grid voltage requires at the same time a variable aerial input, otherwise distortion results.

Of all the methods variation in grid bias is the best, but has the big disadvantage in ordinary screen-grid valves that an increase in grid bias brings the working point of the valve right down on to the sharply bent portion of its characteristic curve A (Fig. 1).

In a set using screen-grid valves the actual gain or amplification is approximately proportionate to the

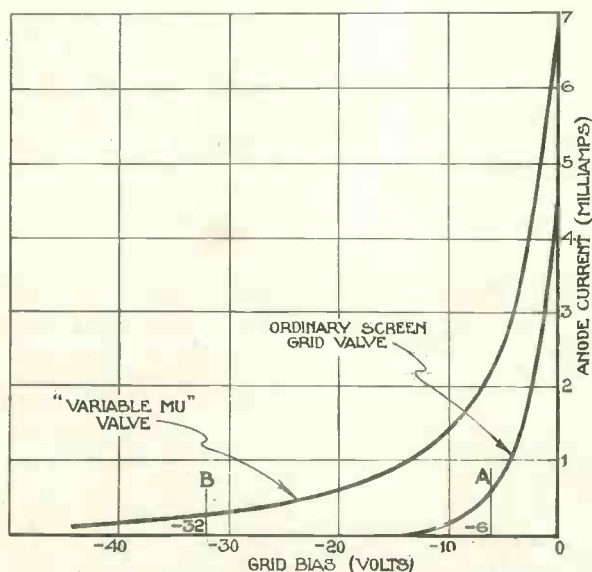


Fig. 1.—Curves showing variation in anode current of screen-grid and variable-mu valves with alteration of negative grid bias

conductance," and thus the "variable-mu" is a valve which is capable of a variable mutual conductance.

This at first sight seems an unnecessary appellation as, strictly speaking, all valves are capable of variable mutual conductance by alteration to the voltages applied to their various electrodes.

# THE VARIABLE-MU VALVE—Continued

mutual conductance of the valve. A reduction in mutual conductance, therefore, by one of the above methods will definitely act as a volume control and if a valve can be produced in which an increase to grid bias does not bring the working point down to a sharply bent portion

such "tail" is of distinct advantage, as we have seen.

To obtain just the right amount of "tail" at the right point is no easy matter, as it depends on a special and rather critical design of the grid. In the variable-conductance valve of the Osram VMS4 type the requisite amount of tailing is obtained by using a grid in the form shown in Fig. 2.

It will be seen that a peculiar form of spacing is adopted between the turns. When the grid bias is set to a low value the effect of the grid voltage (being very small) acts in a normal manner on the flow of anode current from cathode to anode and produces a characteristic practically the same as for an ordinary screen-grid valve.

Actually, at this point the anode current is slightly more than that of a normal screen-grid valve (see Fig. 1), which is deliberately arranged for in order to provide the most useful type of characteristic

for the variable-conductance valve. As the grid bias is slowly increased negatively the gaps or holes in the grid begin to have their effect on the shape of the characteristic.

Those parts of the cathode coming adjacent to the closely wound portions of the grid have their electron

current affected normally—that is, a negative grid bias will tend to suppress the anode current in the normal way.

## Effect of Grid Bias

Those parts of the cathode, however, which are adjacent to the gaps in the grid do not have their electron current controlled to the same extent and consequently the effect of negative grid bias will be much less and the anode current will not fall to the extent which it would do in the normal way.

By means of a most carefully planned spacing between the grid turns it can be arranged for the anode current to be under strong control of the grid up to a definite negative grid voltage and after that to remain under very slight control up to any desired negative grid voltage.

## Linear Characteristic

The effect of the very slight control is to give a linear characteristic and here is where the peculiar advantage of the variable-conductance valve arises.

On a very strong signal, such as that received from the local station, we can arrange for the valve to have a large negative grid bias so that the signal is operating on this very linear portion of the curve. At the same time, the "slope" of the curve at this point is extremely small, so

that we have the ideal conditions of linearity of characteristic giving distortionless reception, and very low "slope" or mutual conductance, giving a considerable reduction in volume.

As the bias is made less negative the mutual conductance increases up to a maximum at about  $-1$  volt (less than 1 volt would introduce grid current), and the volume of the station received will be increased.

As under these minimum conditions of grid bias the set

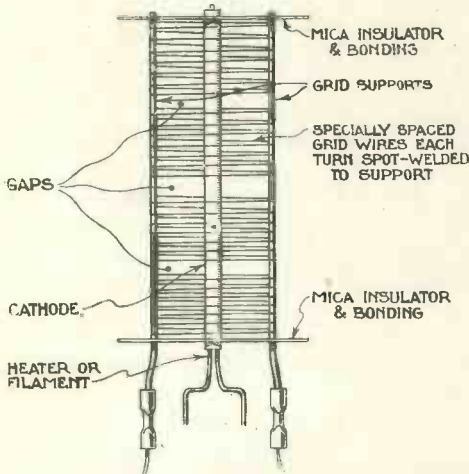


Fig. 2.—Diagram showing the specially-designed grid system of the Osram VMS4 valve

of the curve we have attained our ideal volume control.

Such a valve is typified in the Osram VMS4 class, and it is easily seen how its characteristic differs from that of an ordinary screen-grid valve on comparing the points *A* and *B* on the curves of Fig. 1. The real reason, therefore, for the introduction of the "variable-mu" valve is to give us a form of efficient volume control which will not at the same time introduce distortion.

## Valuable Development

This is an extremely valuable development and it is fairly safe to predict that the variable-conductance valve—to give it its correct term—will be a type of screen-grid valve almost universally employed in the near future.

Now, then, as to why the variable-conductance valve gives us this improvement over the ordinary screen-grid type.

The characteristic shown in Fig. 1 is known to valve designers as one introducing a considerable amount of "tail" and normally this is the thing to be avoided, particularly in power output valves. In the particular case of the high-frequency valve

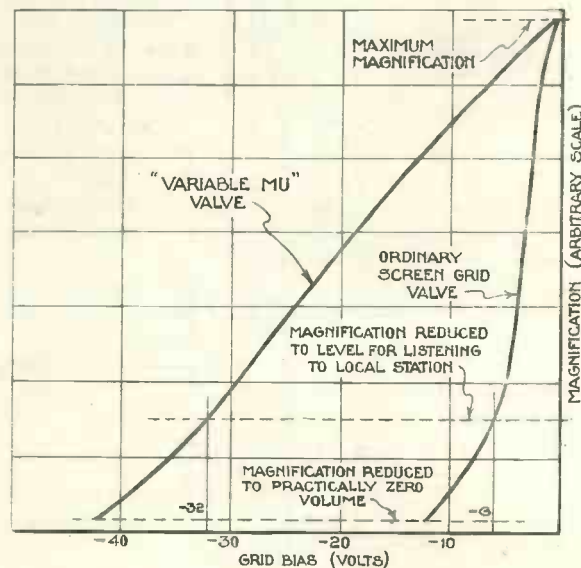


Fig. 3.—Curves showing the effect of negative grid bias on overall magnification of screen-grid and variable-mu valves

# WHY AND HOW IT WORKS

is usually receiving a weak distant station giving very small input, the absolute linearity of the curve is not so important and at this point we obtain the full benefits of the ordinary screen-grid valve in amplification (see Figs. 3 and 4).

## Volume and Modulation

These diagrams show the effect of magnification reduction combined with modulation distortion by increase to negative grid bias with an ordinary screen-grid valve and with the "variable-mu" type.

From reference to Fig. 3 let us assume, say, that a grid bias of 6 volts for an ordinary screen-grid valve and of 32 volts for the VMS4 valve reduces the magnification to a level to avoid detector overload when listening to the local station.

Turning to Fig. 4, it will be seen that for the same negative grid-bias values of 6 and 32 respectively, the modulation distortion with the VMS4 is very much less than with an ordinary screen-grid valve; in fact, it is practically negligible. At low values of bias, such as about 1 volt negative, there is practically no difference in the amplification of the two valves.

In brief, these two diagrams show that to reduce the volume adequately the VMS4 requires a negative bias of 30 to 40 volts in contrast to that of about 6 volts for the ordinary screen-grid valve but for the same level of volume, distortion, which would normally be introduced by the ordinary screen-grid valve, is removed in the case of the VMS4.

## Point of Design

The point of interest in the Osram VMS4 type valve is that it has been deliberately designed with a comparatively low value of initial mutual conductance (1.1 milliamperes/volt), it having been found that higher values than this do not give such a linear control of volume under ordinary working conditions.

The VMS4 class of valve, therefore, is more particularly suited to sets with more than one stage of high-frequency amplification, this arrangement of valves involving more tuning circuits and therefore tending to improve selectivity.

It should be realised that the variable conductance valve *in itself* does not overcome the selectivity

problem and, unfortunately, misleading accounts of the "variable mu" have appeared in the lay press.

It is perhaps unnecessary to mention here that the valve *cannot* simply be plugged into an existing set and a magical improvement in selectivity, sensitivity and quality immediately be experienced!

As for all specialised valves, a correctly designed circuit is required if we are to obtain the maximum benefit from the characteristics described in this article, and in conjunction with such circuits the "variable mu" is certainly most effective in procuring adequate volume control and assisting selectivity.

The important and valuable point

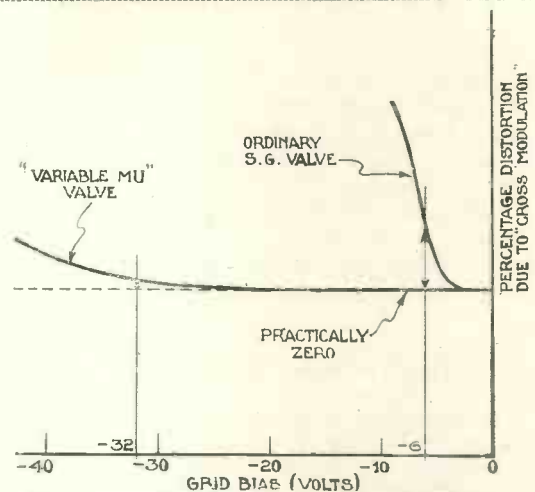


Fig. 4. Curves showing the percentage distortion with negative grid bias for set receiving loud signal

is that the valve enables a distortionless, interference free, and practically constant high-frequency input to be maintained at the detector grid for a wide range of signal strengths at the receiving aerial.

## Music by Wire

### An American Development

AMERICAN telephone companies have other uses for their wires besides letting them to the public to keep in touch with their friends. They lease them to burglar-alarm, news and stock-ticket companies. When a convention or concert is to be broadcast from a hall, it is often sent over a leased telephone wire to a radio studio, thence sent out over the air.

It is easy to transmit music by wire, with a loud-speaker at the receiving end to amplify it. Thus it occurred to Robert Miller, former engineer for the Bell Telephone Laboratories, Inc., that such music might be saleable. With other engineers as associates and himself as president, he formed Wired Music in Manhattan, announced that he would sell music to hotels, clubs, private homes, etc.

### Rates for Subscribers

Wires leased by the mile would hook up New York, Boston, Chicago, Buffalo, and many other cities. Subscribers would pay between £5 and £20 a month, receive programmes from noon until 3 a.m.—luncheon

music, dinner music, and dance music.

There would be no static interference and, because Wired Music planned to hire its own artists, no interpolated advertising.

### Too Big an Order

Well backed financially, Wired Music was ready to begin selling its services in Manhattan recently. But the New York Telephone Company refused to lease its wires; they said it was too big an order. Wired Music, it claimed, "has possibilities of extending to many thousands" of circuits; the company's policy has been to rent out only a part of its spare facilities.

Temporarily balked, Wired Music appealed to the New York State Public Service Commission. The decision was that since the New York Telephone Co. already leases wires, whether "spare" or not, to 200 broadcasting studios, it must do the same for Wired Music, whose request is identical.

An appeal has been lodged by the telephone company.

F. P.

# What "W.M." Sets Are Doing

Here we present eleven enthusiastic reports from readers, both home and overseas, who are getting good results from their home-built sets. When sending your report remember that half a guinea is paid for every photograph of a "W.M." receiver printed in these pages.

## MERIDIAN SHORT-WAVER

(October, 1931)

**HONG-KONG (China).**—Thank you for the Meridian Short-waver. I completed the set the other night and tuned into Saigon at full loud-speaker strength first time. The components are not all as recommended as we are greatly handicapped in variety out here. As most of the shops are run by Chinese, they try to palm you off with Yankee goods. All the parts I used were British.

## OUTSPAN SHORT-WAVE UNIT

(August, 1930)

**BOMBAY (India).**—I have constructed the Outspan Short-wave Unit and am using it in conjunction with a Selector portable. Saigon in French Indo-China and Nairobi come in well. On earphones Germany and Holland are heard without any serious interruption from atmospherics.

## SUPER SENIOR

(October, 1931)

**GLASGOW (Scotland).**—This set certainly "knocks out the goods" and is something to write home about. Stations I could not get properly, even with the Super 60, come rolling in clear, strong and always to be got when wanted. There are no harmonics and, as Mr. James stated, the medium-wave local station does not interfere on the long waves.

It is amazingly silent. It has a wonderful reserve of power, selectivity is very fine and its daylight range is remarkable. I can certainly back up what Mr. James says about this set, but I feel that he is too modest. I am delighted in every way with the set.

## SUPER 60

(March, 1931)

**CLARENCE RIVER (New South Wales).**—Congratulations on the Super 60! We get all the volume we require from our local station, which is about 150 miles away. On a good night we can get any of the forty odd stations in

Australia. We also get the New Zealand and Japanese stations, KFI California, and KZRN Manila.

Out here it is considered a feat to separate the Japanese station that comes in besides 3LO, Melbourne, but the Super 60 will do this without any interference.

**LONDON, E.C.3.**—The Super 60 is indeed all that has been claimed for it, and for the first time I have, at last, achieved real selectivity. I have never received so many foreign stations with any other type of receiver, and can now select my programme with a considerable degree of certainty, even during the bad period of the year.

**LONDON, N.W.6.**—I must thank you for giving such a wonderful circuit as the Super 60 to radio enthusiasts. The actual performance (battery and A.C. models) is far beyond the rosiest possibilities of any commercial set in

received about forty stations which will provide entertainment any night, and over eighty altogether.

**OSLO (Norway).**—This epochal Super 60 is the only set I have been entirely satisfied with. My station log now includes 100 stations. When I tell my friends about what I am able to achieve with this set they always decline to believe me, but a demonstration of the set easily convinces them. I may say they are more than impressed.

**THEALE (Berks).**—Here is my opinion of the Super 60. Once handled and heard it is never forgotten. I have received every station mentioned in your log and numerous others. The selectivity on both wavebands is simply wonderful—the separation of London from Graz and Muhlacker is absolutely complete. The same state of affairs exists on the long waves.

Now for the short waves. It seemed too wonderful to me to be sitting in front of this marvellous receiver and listening to music and speech from America (2XAF and W8XK) at full loud-speaker strength.

But now for its crowning achievement! I can receive BK2ME, Sydney, Australia, at full loud-speaker strength and wonderful quality. Can anyone wish for more?

**TOURCOING (France).**—In your issue of September, 1931, you wanted opinions about the Super 60. To such an order it is not possible to disobey. This set has pleased me very much, not only for the tone rendered, but also for the selectivity which is very striking and for the simplicity of the construction and handling. I have handled many French super-hets and can tell you that the Super 60 is definitely better than any other super-het I have operated.

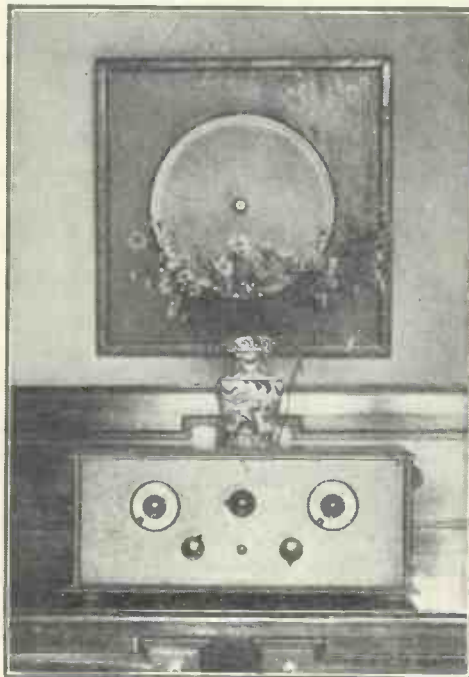
Of course, all that Mr. James claims for his set is right. I cannot give you all the stations logged as they are rolling in one after another. In daylight the powerful stations come in very easily and there are no tricks about the tuning.

In brief, a most gentle set for all, even for those who are not accustomed to tuning. Indeed, a child can tune it without difficulty. Many thanks to Mr. James for this *poste de T.S.F.*

## NEW ECONOMY THREE

(December, 1931)

**COWLEY (Oxford).**—I have made up the New Economy Three and am very pleased with it. Its power is astonishing but so far I have not had time to test its other capabilities in detail. However, I know enough to be able to congratulate "Wireless Magazine."



STILL GOING STRONG

A Carnarvon reader is still getting good results with the New Brookman's Three. It certainly has a handsome appearance

this rather difficult district of London. Using a double-grid valve as first detector is an advantage. I was staggered by the cascade of stations which poured in.

**MABLETHORPE (Lincs.).**—I have had a Super 60 with a push-pull output stage in use for some time, and it is ideal. The volume is all that one requires, the quality is excellent and the selectivity marvellous.

Here, on the coast, we are usually troubled with a great deal of morse, but this source of interference is negligible with a Super 60. I have



# OPERATING THE 1932 SUPER 60



In these notes W. JAMES deals at length with some of the more important points that must be watched in the operation of the 1932 Super 60. With the help of these notes nobody will have any difficulty in getting good results

Here is the set in a Camco Waverley Junior cabinet

IN the aerial circuit of this set is one coil of a band-pass tuner. smaller still, the effective capacity added to the circuit by connecting any aerial would be further reduced. But the signal strength might be too seriously weakened.

The capacity of the condenser used here, namely .00005 microfarad, is in the nature of a compromise between the effective capacity, signal strength and, to a small extent, selectivity. If you have a pre-set condenser, you could connect it in the aerial circuit and note the effects produced as its capacity is reduced.

Across the secondary or grid circuit is joined the grid-filament path of the first valve. This capacity, with the other stray capacities, is usually greater than the

residual capacity in the aerial circuit.

In order to gang the circuits, therefore, we must add to the capacity across the aerial circuit. There is a trimming condenser, fitted in the two-gang condenser, for this purpose and this must be adjusted. The usual procedure is to tune in a distant station and to adjust the trimmer until the signal strength is the maximum and the selectivity is as good as possible.

### Too Much Capacity

If you should discover that the trimming condenser cannot be set to a value where the circuit is sharp, the chances are that the capacity of the aerial is too great.

To get over this, a pre-set condenser should be joined in the aerial wire to the set and if this is adjusted, with the proper trimming condenser at its minimum the circuits will be

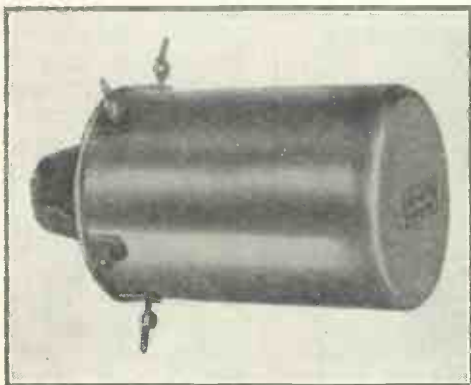
The second coil is connected to the grid of the first valve.

Now, if the two coils are alike, and also the two tuning condensers, all that we have to do in order to gang the circuit is to make the circuit capacities equal.

### Aerial Circuit

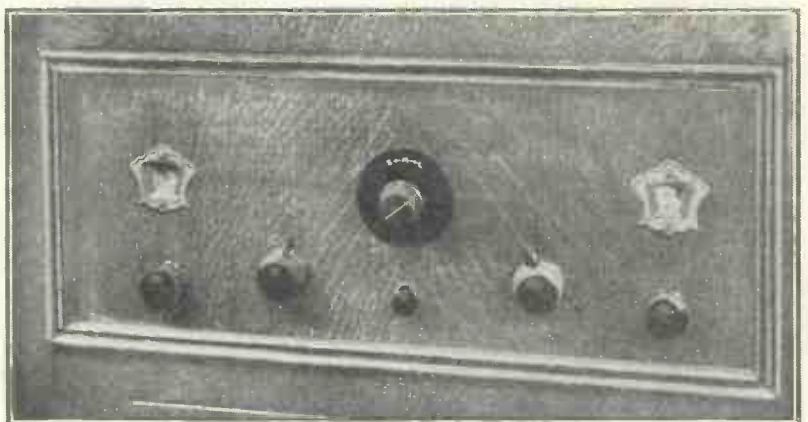
We have in the aerial circuit the capacity of the aerial and wiring. The capacity of aerials varies greatly, but the effective capacity added to the tuned circuit is reduced to a small value by the fixed condenser of .00005-microfarad joined in series with the aerial.

Differences in the capacities of aerials are not so noticeable when this small condenser is fitted. If it were



THREE-RANGE OSCILLATOR

To use the Super 60 three-range type of oscillator in the 1932 version, connect the leads as follows: Black, No. 29; red, No. 44; blue, No. 55; green, No. 54 (and G.B.—1). The white lead is not used. The illustration shows the new type of Wearite oscillator with improved connecting tags



FRONT OF SET WITH THREE-RANGE OSCILLATOR

This photograph shows the front of the 1932 Super 60 when the original Super 60 type of three-range oscillator is used. Full details for construction of the new set appeared in the January "Wireless Magazine." A few copies are available from the Publisher at 1s. 3d., post free

# OPERATING THE 1932 SUPER 60—Cont.



TUNING THE 1932 SUPER 60

The set in its specially designed Clarion cabinet, with loud-speaker cabinet to match. Dozens of stations can be received on a short indoor aerial

ganged. The value of the fixed aerial condenser (.00005 microfarad) is generally satisfactory and it is only in exceptional circumstances that a further condenser will have to be added.

In a correctly designed and adjusted band-pass circuit the coupling of the two parts ought to be such that a double-hump form of tuning is not obtained. The tuning curve ought to be as broad as possible, consistent with the necessary selectivity, but a double-hump is not needed and is, in fact, to be avoided.

When there is pronounced double-humped tuning the station is heard at two places, perhaps a degree on the scale of the tuning condenser apart, and between these two points the signal is weaker. The result is that one generally tunes to one of the humps, which is quite wrong.

### Ganging Essential

The selectivity is usually poor when the humps are pronounced and, further, the side bands are not properly passed when tuned to one of the humps or to the trough between them. Although the ganging is easy, therefore, it is necessary to

see that the circuits are accurately ganged.

The first valve in the set is a four-electrode type. High tension is obtained via the wander plug H.T.+1. It is necessary to discover the best value whilst listening. In my tests about 75 volts gave the best results, but a surprisingly low value is sometimes found most suitable.

Wander plug

tuning with the result that the selectivity is not quite so good.

Further, the magnification will be greater. A suitable voltage is, however, soon found by testing, but a point of importance to users of batteries is that the voltage on the screens should be no more than is necessary in order that the amount of the high-tension current shall be the minimum.

### Running from Mains

If a mains unit is available and it is of sufficient capacity, a larger power valve can be fitted, when the volume obtained from many stations will be greater. The supply to the first valve through plug H.T.+ should be from a potentiometer circuit in the mains unit and be adjusted in the usual way.

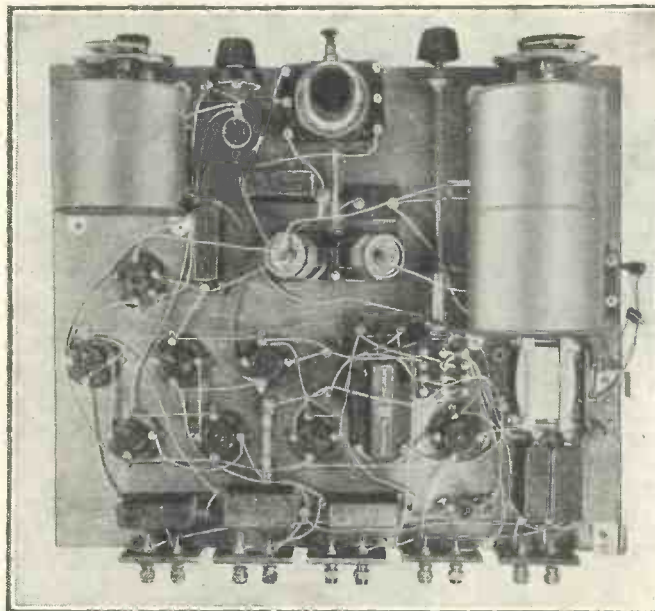
It would also be better to feed the screens of the two screen-grid valves from a potentiometer, but in many cases the adjustable resistance often fitted in the unit will be satisfactory as a voltage regulator.

If the voltage of the power tapping is only 120 at the current taken by the set, then plug H.T.+3 may be connected to it. But if the unit provides a higher voltage, such as 150, only the detector and power valves ought to be joined to the full voltage.

The two screen-grid valves should be supplied through a resistance of about 5,000 ohms. It is easy to arrange for this. Wires Nos. 49 and 48 are in the high-tension circuit. Remove No. 48 and take the end of No. 49 from the 2-microfarad condenser to terminal H.T.+3. Join the end of the resistance to the 2-microfarad condenser with wire No. 47 and take the other end of the resistance to terminal H.T.+3.

### Voltage of Power Tap

The set works very well when high tension is obtained from a mains unit provided the voltages are adjusted to the correct values. It must be remembered that the



ILLUSTRATING THE SIMPLE LAYOUT

There is no difficulty about the construction of the 1932 Super 60. A full-size blueprint can be obtained for 1s. 6d.; ask for No. WM269. A few copies of the January issue are obtainable for 1s. 3d. each, post free

H.T.+2 is taken to about 60 volts. This is for the screens of the two intermediate-frequency valves and you may find that the results are improved by using 70 or 75 volts. There will be a change in the selectivity and the magnification obtainable when the voltage on the screens is altered.

An increase in the voltage will lower the impedance on the two screen-grid valves and the high-tension current will be greater. The effect of this is to broaden the

# W. JAMES' ALL BAND-PASS RECEIVER

voltage of the power-output tap varies with the current.

If the unit is rated at, say, 150 volts, 20 milliamperes, the voltage is likely to be 200 at 15 milliamperes. The chief advantage of a mains unit is that a larger power valve may be used, although the questions of cost and reliability are also important factors.

## Pick-up Volume

With the small power valve normally used with batteries, the volume is just enough for many amateurs. The output from a pick-up must be well cut down in order to avoid serious overloading.

A potentiometer connected across the pick-up is essential. This may be fitted to the motorboard of the gramophone and the sliding contact and one side of the potentiometer are taken to the pick-up terminals.

A shielded cable may be necessary instead of ordinary flex if the pick-up is several feet from the set. The metal braiding forming the shielding should be earthed.

## POINTS OF DESIGN

[Points of interest about the design of the 1932 Super 60, which was fully described in the January issue of "Wireless Magazine," are that it comprises six valves, the combination being a first detector, oscillator, two screen-grid intermediate-frequency amplifiers, second detector and power output valve.

The aerial input is taken to a

## COMPONENTS NEEDED FOR THE 1932 SUPER 60

### CHOKE, LOW-FREQUENCY

- 1—Tunewell, type S20/25, 12s. 6d. (or Igranic, Bulgin).

### COILS

- 1—Lewcos band-pass filter, type BPF, 12s.  
1—Lewcos oscillator, type TOS, 8s. 6d.  
2—Lewcos super-het intermediates, with pig-tails, type IFTP, £1 1s. (or Wearite OT2, Igranic).  
1—Lewcos super-het intermediate, without pig-tail, type IFT, 10s. 6d. (or Wearite OT1, Igranic).

### CONDENSERS, FIXED

- 1—T.C.C. .00005-microfarad, type 34, 1s. 6d.  
1—Telsen .0002-microfarad, 6d. (or Dubilier, T.C.C.).  
1—Telsen .001-microfarad, 6d. (or Dubilier, T.C.C.).  
1—T.C.C. .01-microfarad non-inductive, type S, 2s. 6d. (or Dubilier).  
5—Telsen 1-microfarad, 11s. 3d. (or Dubilier, T.C.C.).  
2—Telsen 2-microfarad, 6s. (or Dubilier, T.C.C.).

### CONDENSER, VARIABLE

- 1—Ormond .0005-microfarad two-gang, type R/429/S2, with disc drive, 16s. 6d. (or Utility, Jackson).  
1—Ormond .0005-microfarad, type R/429/S1, with disc drive 9s. 6d. (or Utility, Jackson).

### HOLDER, GRID-LEAK

- 1—Readi-Rad, 6d. (or Bulgin, Telsen).

### HOLDERS, VALVE

- 9—W.B., miniature type, 6s. (or Benjamin, Wearite).

### PLUGS AND TERMINALS

- 4—Belling-Lee wander plugs, marked: G.B.+ , G.B.—1, G.B.—2, G.B.—3, 8d. (or Clix, Ealex).  
10—Belling-Lee terminals, marked: H.T.+3, H.T.+2, H.T.+1, H.T.—, L.T.+ , L.T.—, L.S.+ , L.S.—, Pick-up (2), 5s. (or Clix, Ealex).

### RESISTANCES, FIXED

- 2—Sovereign 20,000-ohm, flexible type, 1s. 8d. (or Lewcos, Bulgin).  
1—Telsen 1-megohm grid leak, 9d. (or Dubilier, Watmel).

### RESISTANCE, VARIABLE

- 1—Wearite 15-ohm rheostat, with bracket, 1s. 9d. (or Varley, Lissen).

*The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower*

### SUNDRIES

- Tinned-copper wire and oiled-cotton sleeving (or Jifilinx).  
5—Sovereign terminal blocks, 2s. 6d. (or Belling-Lee, Junit).  
1—Pair Bulgin grid-bias battery clips, type No. 1, 6d.  
1—Readi-Rad 100-milliamper fuse bulb with holder, 1s. 3d. (or Belling-Lee, Bulgin).

### SWITCH

- 1—Wearite four-pole change-over, type 124, with terminals, bracket, and 8-in. extension rod, 5s. 6d.

### TRANSFORMER, LOW-FREQUENCY

- 1—R.I. general purpose, ratio 1 to 7, 10s. 6d. (or Ferranti AF3, Telsen Radiogrand).

### ACCESSORIES

#### BATTERIES

- 1—Ever Ready 120-volt popular power, £1 4s. (or Pertrix, Drydex).  
1—Ever Ready 9-volt grid-bias, Winner type, 1s. (or Pertrix, Drydex).  
1—Dagenite 2-volt accumulator, type RMF9, 13s. 6d. (or Exide, Pertrix).

#### CABINET

- 1—Clarton, with wood panel and baseboard, £1 1 s.

#### LOUD-SPEAKER

- 1—W.B. PM3 moving-coil, cabinet model, £3 15s. (or Amplion, Blue Spot).

#### VALVES

- OSCILLATOR  
1—Cossor 210LF, 8s. 6d. (or Mullard PM1LF, Mazda L210).

#### FIRST DETECTOR

- 1—Cossor 210DG, £1 (or Mullard PM1DG).

#### S.G. INTERMEDIATES

- 2—Cossor 220SG, £2 (or Mullard PM12, Mazda S215B).

#### SECOND DETECTOR

- 1—Cossor 210Det, 8s. 6d. (or Mullard PM1HL, Mazda HL210).

#### POWER

- 1—Cossor 215P, 10s. 6d. (or Mullard PM2, Mazda P220).

#### MAINS UNITS

The following may be used in place of the high-tension battery:

- Heyberd, model D150, £4 6s. (or Formo, type Multivo, £5 5s.; Regentone, type WIC, £3 10s.).

band-pass tuner, the wavelength of which is adjusted by means of a two-gang condenser. The oscillator coil

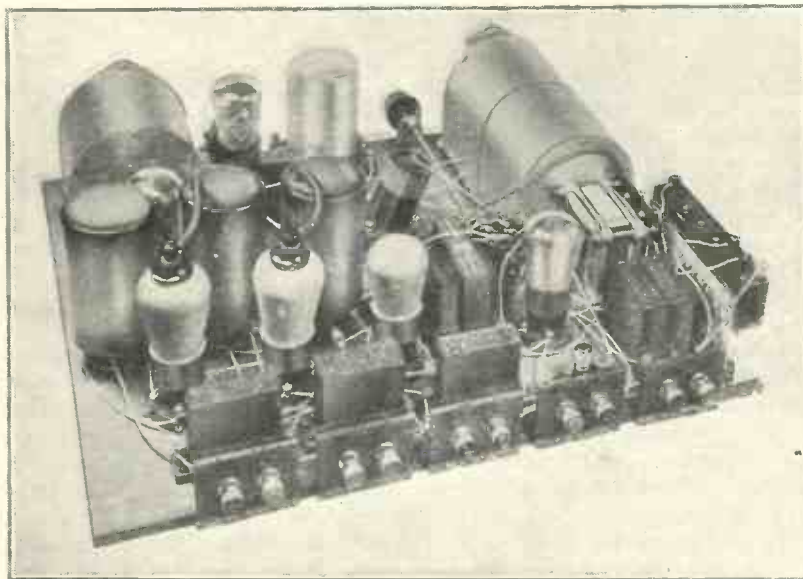
covers the medium and long waves; the change from medium to long waves is made by adjusting a single knob, which operates the switches of the band-pass and oscillator coils.

Sufficient decoupling is incorporated to make the set quite stable when operated from a mains unit for high tension. Those who want a complete mains set are referred to the special A.C. design that appears elsewhere in this issue.

## Improvement on Original

The 1932 Super 60 is a great improvement on the original Super 60, details of which were published last March. The later set is more selective because the band-pass tuner is sharper than the frame aerial.

There will be no difficulty about the construction if use is made of a "Wireless Magazine" full-size blueprint. Copies of this can be obtained for 1s. 6d., post free, if application is made to "Wireless Magazine," Blueprint Dept., 58-61 Fetter Lane, London, E.C.4.]



LOOKS LIKE A STATION-GETTER, DOESN'T IT?

In one evening the 1932 Super 60 brought in fifty-seven stations during a test in South-east London. There is band-pass aerial tuning and records can be played by turning a single switch

# RADIO IN REVIEW

ONE cannot, of course, look very far ahead in a subject like wireless, because there is always the chance of some new discovery coming along to revolutionise existing practice. But there are one or two interesting "pointers" already appearing above the horizon to indicate possible lines of development in the near future.

## Short-wave Adaptors

For instance, the use of short-wave adaptors designed to enable an ordinary broadcast receiver to be tuned down to stations between 16 and 60 metres is now so general that the time seems to be ripe for making it a part of the standard equipment of every set.

Naturally, it means a little extra complication, but there are so many good things to be heard just now on that part of the waveband that the addition should be well worth while.

Then there is the provision of automatic volume control designed to prevent the necessity of having to jump up every few minutes, when one is listening to a distant station, in order to keep the loud-speaker from sinking to a mere whisper as "fading" sets in. The variable-mu valve has opened the door to this improvement and it ought to come into general use before long.

The new metallised valves also promise to become standard practice. This will lead to the disappearance of the ugly "can" screens which take up so much valuable space inside the set.

## Tone Controls

The use of tone controls for the loud-speaker—so that one can switch over from a "mellow" response on orchestral music to a higher-pitched tone for speech—is another useful innovation which should prove popular.

Things are beginning to look a little more promising in television. New methods of scanning are being developed to remove the difficulty of transmitting larger and better

## MORTON BARR

Discusses

Short-wave Adaptors,  
Automatic Volume Control,  
Metallised Valves,  
Tone Controls,  
Television Possibilities,  
Selectivity and Sidebands,  
and  
Interference

pictures, and there are prospects of space being made available for television transmission on the shorter wavelengths.

Notable improvements are also being made in the sensitivity of the light-sensitive cells used at the transmitting end, and in the efficiency of the glow lamps required for reception.

After all, in the early days of broadcasting millions of listeners throughout the world were delighted to hear the programmes on a crystal set. They did not wait for the development of the super-het, or the all-mains receiver, before making a beginning. And it will be the same with television, once it becomes possible to send out picture programmes of reasonable interest value.

One cannot help noticing in modern radio practice a tendency to aim deliberately for an exaggerated effect in one direction, and then to apply some method of compensation in order to restore the correct balance.

For instance, in striving to attain razor-edge selectivity the designer will not hesitate to cut the sidebands so severely on the high-frequency side that he is compelled to use a tone-compensator on the low-frequency side of the set in order to counterbalance the high-note loss.

Another case in point may be seen in some of the cheaper self-contained sets fitted with a moving-coil loud-speaker. Here the inter-valve coupling circuits are deliberately de-

signed to over-emphasise the high-frequency notes, the designer relying upon the low-note bias of the moving-coil loud-speaker to put matters right.

In the same way, a poorly designed or inefficient type of loud-speaker is often camouflaged by the expedient of forcing up the power output from the last valve.

## A Vicious Circle

Even on the transmitting side the authorities persist in adopting a mistaken policy merely on the ground of expediency.

For instance, the only effective remedy for the present appalling condition of the ether is a drastic limitation in the number of transmitters now in operation, and a fair and equitable distribution of the available wavelengths amongst the various countries concerned.

Instead, each nation is vainly attempting to over-ride the scientific laws of selectivity and to shout down its neighbours by increasing the power output of its own stations. It is true that this achieves the limited object of serving their own citizens, but it is obviously short-sighted from the broader or international point of view.

## Local Services

When everybody is shouting hard, few outside the immediate circle can hear what anybody is saying. And the worst of it is that it opens up a vicious circle, because presently, when every station is in full blast, there will have to be another all-round increase in power to keep even the local services free from interference, and so it will go on.

The tendency of certain foreign stations to use excessive modulation is another unfortunate symptom. By over-modulating the carrier wave it is possible to increase the range of reception—which is, no doubt, a desirable thing in itself for stations which depend upon advertising for their revenue—but it almost invariably causes distortion at the receiving end.

# "Wireless Magazine" GRAMO-RADIO SECTION

## Gramo-Radio in Pictures



**THE RECORD BREAKER!**

Don't "break records" like this competitor at the sports meeting of the Columbia Graphophone Co., Ltd. It might prove an expensive pastime!



**A HANDSOME OUTFIT**

This photograph shows the attractive appearance of the Marconiphone model 330 radiogram. It is a three-valver and costs 32 guineas



**AUTOMATIC RECORD-CHANGING**

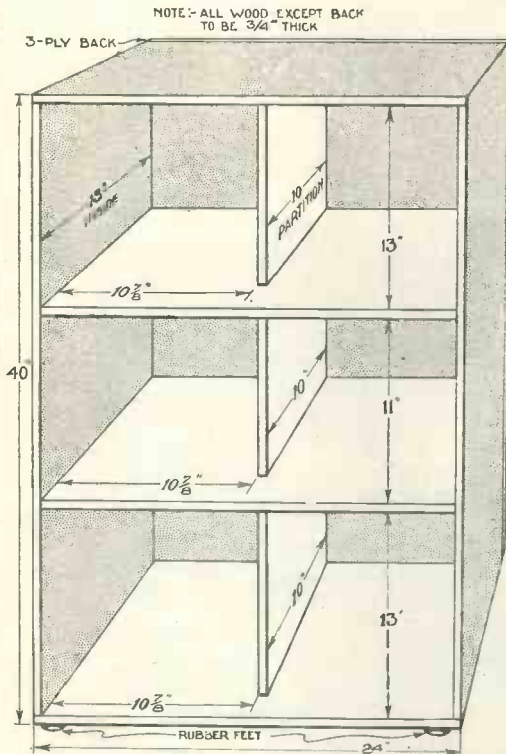
This H.M.V. automatic record-changing desk converts a plain radio set into an automatic radio gramophone. The price, in a walnut cabinet, is 18 guineas.



**ANOTHER AUTOMATIC CHANGER**

The record-changer fitted to the Marconiphone model 536 radio gramophone is similar to the H.M.V. device illustrated on the left

# RECORD STORAGE



How to make a storage cabinet to hold 500 records for about £1—something that will interest every grammo-radio and gramophone owner. This article by R. BIBRA also explains a simple system of indexing

There are various methods of storing records; the advantages of each are dependent upon the number of records to be stored in the space available. If one has a large bank balance and not more than a hundred records, one cannot do better than use one of the ingenious commercial filing cabinets.

The H.M.V. system is interesting, but has its limitations in so far that storage of more than a hundred records is likely to take up considerable space. It is claimed that

tion of records, but they are clumsy and, unless packed tightly when stored on a shelf, the records will be inclined to warp.

They are useful, however, when one wishes to take a few records round to a friend's house for the evening.

## Cheap and Satisfactory

If one has a large collection of records, there is a system which I propose to describe here. It is the cheapest and most satisfactory one that I have yet heard of. It is presumed that readers who wish to adopt this system of storage are in the habit of buying records from time to time and, therefore, provision is made for records to be

**H**OW do you store your records? Do you keep them piled upon one another in the corner of the room, filed upon shelves, or neatly stored in albums? Records are delicate articles and should be treated with care.

It is surprising the number of people who spend quite a considerable sum each month on new records, but treat their purchases with little care.

## Life of Records

Although the pick-up of the modern radio gramophone wears records considerably less than the old acoustic instruments, the life of the average radio-gramophone owner's records is probably shortened more by ill treatment and storage than the wear and tear received by actual playing.

If records are stored carefully and played on a good make of gramophone or radio gramophone with a properly damped pick up and correct needle-track alignment, they will entertain you for years without loss of quality.

it is impossible to break a record when taking it out of this type of filing cabinet.

The cabinet consists of two shelves divided into fifty divisions, each of which will house a single record. Each division is numbered and a chart with corresponding numbers is mounted on the inside of the doors.

When one wishes to play a record, reference is made to the chart, the number noted and the lever for the particular division is pressed: the record then rolls out and if, by any chance, it should fall on to the floor, it will not break, as it comes down on its edge.

The price of these cabinets is in the neighbourhood of £17.

Albums made by the principal gramophone companies are useful for the man who has a small collec-

added to the collection without disturbing the indexing and storage.

The chief advantage of the following system is that it is applicable to any number of records from 10 to 10,000. It can be extended with the utmost ease and there is no possibility of the records warping.

## Vertical Storing

It is proposed that the records should be stored vertically on shelves; these shelves may be either those of an existing cupboard or they can be constructed cheaply with any suitable wood.

I have constructed a filing cabinet to hold up to 500 records for the exceptionally reasonable cost of 15s. If the cabinet is to be made, the inside shelves of any convenient length should be 13 in. deep by 13 in. high or, if the constructor

*On the left are shown the dimensions of a simple cabinet to hold about 500 records. It can be constructed quite cheaply of American white-wood or deal. The edges may be screwed together, providing they are carefully squared up. It is advisable that 3/4-in. wood should be used, as the weight of a large number of records is quite considerable—fifty records weigh nearly 30 lb. It is intended that the 12-in. records should be stored on the top and bottom shelves, whilst 10-in. records can be kept on the middle one. The back can be made of thinner wood if desired. The top of the cabinet will be found very useful as a support for a radio set, table radio gramophone or playing desk. Two coats of mahogany or walnut combined stain and varnish will give your home-made cabinet a pleasing appearance*

proposes to store a number of 10 in. records, one shelf could only be 11 in. high.

If the cabinet is more than 2 ft. in length, it is advisable to divide the shelves into two or three sections by inserting vertical struts of wood.

The records are placed in either the paper cover envelopes in which they are purchased, or better still,



NUMBERING THE COVERS

The record covers should be numbered on both sides as shown in this photograph. Any desired disc can then be picked out in a moment

thin cardboard envelopes which may be bought for about 1s. per dozen. The records are placed on shelves vertically, but with the opening of the envelope outwards.

The covers are then numbered consecutively from left to right on the top corners, both sides. It is necessary to have a small catalogue or index, which may be simple or elaborate as desired.

If the collection is not more than 100 records to start with, the index can be divided into three classes—dance, vocal, and orchestral. It must be stressed that records in these classes are not placed in any special order on the shelves; for instance, record No. 1 might be a dance record, Nos. 2 and 3 vocal records, and No. 4 an orchestral record.

#### Simple Index

After the collection of records has been filed on the shelves, and their respective numbers are noted in the index, you will now see how simple it is to locate any required record.

Supposing we wish to play the *Fledermaus* Selection,

we look among the orchestral-record index and find it is No. S3. We then run a finger along the top of the envelopes until we come to No. S3; it is very easy to locate the numbers as the edges of the envelopes may be bent over.

The envelope is not completely withdrawn, but only pulled out a few inches; the record is then rolled out.

When the selection has been played and it is desired to replace the record in the cabinet, its cover is "just shouting" for the record to be filed in the correct place.

It is, of course, necessary to file 10- and 12-in. records on separate shelves or in separate sections of shelves. New records are just added to the end of the existing stock, given the next available number and noted in the index.

If it is desired to take a number of records round to a friend's house, they can be withdrawn complete with their covers. When the records are returned, it is only



A COMMERCIAL STORAGE CABINET

This is the H.M.V. record-filing cabinet. It holds 100 discs each of which is filed in a separate compartment. There is an index chart on the inside of each door

necessary to file them in their correct order.

It will now be seen how extremely simple this system of filing really is. The cabinet can be constructed by anyone having small experience of wood work, or a local jobbing carpenter would make a cabinet to hold 500 records for about £2.

It is a good idea to have a curtain of thin silk or other material across the front of the cabinet mounted on a rod, as doors are rather unwieldy.

It is advisable to make the cabinet larger than one's original requirements, the spare space being utilised for books.

#### Pack Tightly

It is important that the records should be packed tightly on the shelves, otherwise there will be a tendency to warp. If records are already warped and they are packed tightly, after a few weeks this defect will probably be remedied.

If a shelf is not completely full of records, fill up with books to keep the records tightly packed together.

#### SPECIMEN SECTIONS FROM A SIMPLE FORM OF INDEX

To distinguish 10-in. records from 12-in. records, it is advisable to have a separate series of numbers for each size; for example, 10-in. records could have the prefix "S" before the numbers

#### VOCAL

- S1 *The Pipes of Pan (The Arcadians)*  
*Arcady is Ever Young (The Arcadians)* Winnie Melville
- S2 *You're Just a Lover*  
*Now You're in My Arms* George Metaxa
- 1 *Song of the Volga Boatmen*  
*The Prophet* Chaliapine

#### ORCHESTRAL and INSTRUMENTAL

- 2 *A Night in Venice*  
*Berlin State Opera Orchestra*
- S3 *Fledermaus Selection*  
*Raie Da Costa (Pianoforte)*
- 3 *Gipsy Love Selection*  
*De Groot and His Orchestra*
- S4 *You're My Heart's Delight*  
*Changing of the Guard*  
*Jack Hylton and His Orchestra*
- S5 *For You*  
*Me* Ambrose and His Orchestra

# New Automatic Record-changer

ON first seeing the new Columbia radio gramophone, we were greatly intrigued with the simplicity of the record-changing device. It is the most foolproof automatic record-changer we have yet examined.

which takes up very little extra space on top of the motorboard, and is cheap enough to be included in the moderate-priced model 604.

The main part of the changer is the carrier arm, which can be

it is called, must be set to either 10-in. or 12-in. positions.

The next thing is to set the indicator to the number of records to be played. The rest of the process is done for you. Just press the button, having previously switched on the mains, and the arm will then start on the turntable with the first record, at the end of which the next record will be released and so on until all those loaded in the first place have been played.

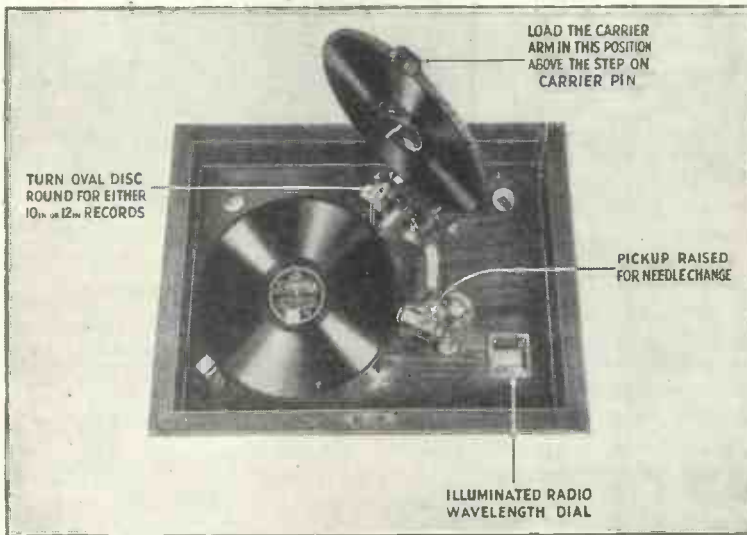
### Different Makes

Different makes of records can be played, provided their diameter does not vary from the normal by more than  $\frac{1}{4}$  in. Any chosen section of a record may be played repeatedly—a boon to students of music or languages.

When the record is stopped the amplifier is disconnected, so you do not hear the slowing down of the record.

An excellent point is that the carrier arm can be freshly loaded with another set of records while the last record of the first set is being played—non-stop music as long as the needle lasts.

The average time taken to change a record is a matter of a few seconds. We timed the interval between the stopping of one record and the starting of the next and found it was only eight seconds.



HOW THE COLUMBIA RECORD-CHANGER IS LOADED

This view shows the simple method of loading the new Columbia automatic record-changer, which is fitted to the radio-gramophone model 604

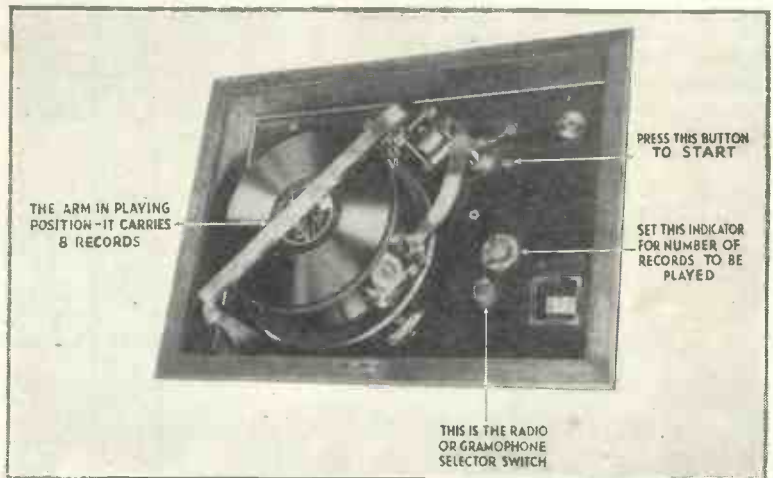
The two photographs on this page show the main essentials of the device, which is incorporated as a standard fitting in the latest addition to the Columbia radio-gramophone series, model 604, selling at the extremely moderate price of 47 guineas.

### More Next Month

We shall have more to say in the Set Selection Bureau pages of the next issue about the actual machine. Here we are concerned only with the gramophone record-changer. Pending the development of records that will play for a reasonably long time, say half an hour, we shall have to put up with the tedium of changing records every few bars of music, or console ourselves with a machine that will do the record changing for us.

The earliest record changers were cumbersome and expensive—but these drawbacks do not apply to the new Columbia changer,

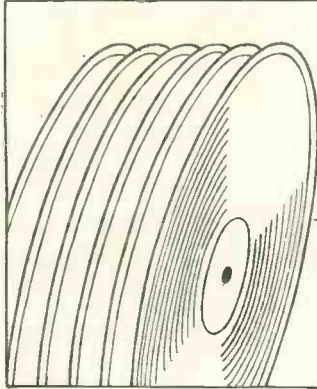
loaded in a few moments with as many as eight records, which may be either 10-in. or 12-in. diameter. The records are very simply held in position by a carrier pin. Before playing, the record "pusher," as



THE RECORD-CHANGER READY FOR PLAYING

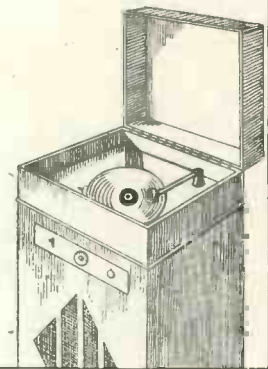
Another view of the Columbia record-changer adjusted for playing as many as eight discs without reloading





# Your Choice of New Records

By WHITAKER-WILSON



Outstanding records are indicated by an asterisk (\*) against the title

## SACRED MUSIC

★(a) As With Gladness Men of Old, (b) Brightest and Best of the Sons of the Morning, St. George's Chapel Choir, 2s. 6d. COL DB656  
A good balance of tone. The speed is, also, as it should be! This makes an excellent Epiphany record.

(a) O Come, All Ye Faithful, (b) Silent Night, Holy Night, pipe organ with vocal refrain, 1s. 1d. PIC 445

What is a pipe organ, please, Piccadilly? Don't be silly! All organs have pipes in them. How on earth do you think the sound is made?

(a) O Come, All Ye Faithful, (b) Good King Wenceslas, Black Dyke Mills Band and choir, 1s. 6d. WIN 5410

A choir and a military band. Quite well done. The band is better than the choir. Other discs of this type, and by the same people, are *The First Novel*, *Hark the Herald*, *Christians Awake*, and *While Shepherds Watched*. All quite good.

★(a) O Rejoice that the Lord has Risen, (b) Miserere, Stiles Allen, sop.; Hardy Williamson, ten., 2s. WIN L5397



Stiles Allen

(a) is from *Cavalleria*; (b) from *Il Trovatore*. Both are well done, as one has learnt to expect from Madame Stiles Allen. Certainly to be recommended!

## GRAND OPERA AND CLASSICAL ARIAS

★(a) One Fine Day, (b) Entrance of Butterfly, Marguerite Perras, sop., 2s. BRDCST 5260B

A very cheap operatic record.

It is most attractively sung and rendered generally. Certainly ask for it.

Ride of the Valkyries, Berlin Philharmonic Orch. (d.s.), 2s. BRDCST 5261B

This is done quite well enough to recommend. The upper strings seem a little squeaky, but they often do. Anyhow, if you have no record of the "Ride" buy this as being an inexpensive start.

★(a) Rigoletto—Quartet (Act 3); Fairest Daughter of the Graces, (b) Il Trovatore—Duet; Miserere Scene, Mir-



Heddle Nash

am Licette, Heddle Nash, and male chorus, 4s. COL DX302

This is cheap at four shillings. It is one of the best operatic records I have heard for a very long time. I sincerely recommend it.

## ORGAN MUSIC

★(a) Song of Songs, (b) Serenade (Standchen), organ solo by Quentin Maclean, 2s. 6d. COL DB663

Quentin Maclean is easily the best of the cinema organists, and I think he is to be recom-



Quentin Maclean

mended in that he has not the glaring faults evinced by most of the others. This is distinctly good.

## PIANO SOLOS

★(a) La Fileuse, (b) Melody in F, Maurice Cole, 2s. BRDCST 5262B

Maurice is in a popular mood, apparently! He plays both delightfully and I think the record should appeal to many lovers of light pianoforte music. Anyhow, it is much better than that syncopated rubbish!

## CHAMBER MUSIC

★La Folia, Master Yehudi Menuhin (d.s.), 6s. H.M.V. DB1501

For so young a player this is, of course, remarkably good. Whether the disc is worth the



Yehudi Menuhin

price marked on it is another matter. It all depends on how you look at it; do you pay for "prodigydom," or for art and experience?

## LIGHT ORCHESTRAL MUSIC

★(a) Blaze Away March, (b) Father Rhine March, Walter Porschmann, 2s. 6d. H.M.V. B3828

Not of the military band in effect, these marches are rather distinguished on that account alone. I think they will appeal.

(a) Capricious Music-box, (b) Christmas Melodies by the Fireside, Athenaeum Light Orch., 1s. 1d. PIC 404

A sort of Christmas-party record. The music-box comes out well; anything of that type records perfectly, of course.

Christmas Jingles, Rolando and his Blue Salon Orch. (d.s.), 1s. 6d. WIN 5412

This is quite a good band; the record contains more bass than is general. The pizzicato of the double-bass is very distinct. The music is quite attractive.

Good Old-time Songs, Jerry Hoey and his Band (d.s.), 1s. 1d. PIC 742

Quite good. *The Sunshine of Your Smile* is a specimen of the contents.

★Haydn Wood's Songs, Commodore Grand Orch. and organ (d.s.), 1s. 6d. WIN 5400

This I recommend for the sake of the melodious music. I have a real respect for Haydn Wood. I do not care for the rendering; the presence of the cinema organ largely accounts for that, of course.

★Moldau, Berlin State Orch. (d.s.), 6s. H.M.V. D1986

This is by Smetana, the Bohemian composer. It is most beautifully rendered and makes good light music. It should go amongst the classics, but I am placing it amongst the lighter orchestral records because I think I ought to recommend it to those who are not interested in the other kind.

★(a) Moldau, (b) Hungarian March, Berlin State Orch., 6s. H.M.V. D1987

This contains the last section of *Moldau* and also the fine arrangement by Liszt of Schubert's Hungarian March.

★Noel Coward's "Cavalcade," Commodore Grand Orch. (d.s.), 1s. 6d. WIN 5399

I have listened to this carefully. I can see nothing in it that is attractive from the musical point of view. Perhaps that is because I have not seen the play. Anyhow, I recommend it as being very well produced and likely to appeal to many. Ask for it.

Pantomime Hits, London Orch. (d.s.), 2s. 6d. ZONO 6000

That is to say, fairly modern pantomime hits. *Jolly Good Company* might be cited as a clue to the contents of a well-produced record.

★Paul Jones, Arcadians Dance Orch. (d.s.), 2s. 6d. ZONO 5985

A very acceptable selection, including such numbers as *River*, *Stay Away*, *Twilight*

# YOUR CHOICE OF NEW RECORDS—Cont.

*Waltz, For You, etc.* The band is a good one and the recording I consider exceptionally good, even for Zonophone.

★**Poet and Peasant, State Opera House Orch., Berlin (d.s.), rs. 6d.**

**BRDCST 3123A**

The whole point about this is that it is done by a good orchestra, is well recorded, and is cheap. Otherwise I cannot see much point in it as there must be dozens of records of this work in existence.

(a) **Popular Song Hits—Selection, (b) Rhapsody in Black, London Orch., 2s. 6d.**

**ZONO 5973**

A very good selection. (a) includes such as the *Queen was in the Parlour*, (b) such as *What's Keeping My Prince Charming*. Both singing and playing are good, the latter specially.

(a) **Rosary, (b) I Hear You Calling Me, Sgt. Norman Bettinson, rs.**

**BRDCST 784B**

A cornet and a cinema organ! Very nice too. The cornettist seems to be dribbling down his instrument; I do not like this *shudder*. Otherwise no complaints!

(a) **Savoy Christmas Medley (f.), (b) Childhood Memories Medley (one-step), Lloyd Shakespeare's New Piccadilly Band, rs. rd. PIC 401**

Rather a strange medley, methinks! *The First Nowell, Little Brown Jug, and Three Blind Mice* seem to me to be rather over-medleying it, surely? However—

(a) **Simple Avenu, (b) Salut D'Amour, string orch., with organ, rs. 6d.**

**BRDCST 3129B**

Two popular items very effectively done, especially where the strings drown the organ, which is a harsh-toned specimen.

★(a) **Song of Songs, (b) Because, Renee Chemet, 4s. H.M.V. DA1231**

Very good violin-playing. This



**Renee Chemet**

is rather an expensive record, but it is distinctly good. I certainly recommend it.

(a) **Wedding of the Three Blind Mice, (b) Nellie Deane, International Novelty Quartet, 2s. 6d. ZONO 5982**

Good as a light music record with nothing brilliant about it. The bass is very good from the recording point of view. You might make it one of your test records, (b) especially.

(a) **When the Chapel Bells were Ringing, (b) Pagan**

**Serenade, Howard and Hardy, rs. RAD 1566**

I like the Serenade very much. It is in waltz time, but is rather in the nature of light orchestral music.

(a) **Wine, Women, and Song, (b) Hungarian Dances, Eugene's Magyar Tzigane Band, rs. 6d. BRDCST 3124A**

Strauss and Brahms on a Tzigane Band! The latter is hopeless from a rendition point of view, but if you do not mind your Brahms thrown at you in this fashion you should invest in this.

(a) **You Are My Heart's Delight, (b) Standchen (Serenade), Scala Trio, rs. RAD 1568**

This is quite a good trio; I have always enjoyed its records. This one is well worth hearing. Ask for it.

## LIGHT SONGS AND BALLADS

(a) **Auld Scots Pals O' Mine, Ron Howard, (b) Just a Song called "Home Sweet Home," Howard and Hardy, rs. RAD 1570**

Neither greatly appeals to me. The words are rather poor in both instances. Nothing original about either. Sorry! I cannot recommend it.

**Cavalcade, Henry Oscar with orch. (d.s.), 4s. H.M.V. C2330**

A descriptive record containing old favourites. Quite good.

(a) **Farewell My Native Irish Home, Mattie Haskins, (b) Shall My Soul Pass Through Ireland, Matthew Haskins, rs. rd. PIC 863**

I cannot be very fair to this I am afraid. The singing is so atrocious that I have no patience to listen to either song.

(a) **Hero and the Villain, (b) Changing of the Guard, Herbert Thorpe and Foster**



**Foster Richardson**

Richardson, 2s. 6d. **ZONO 6006**

Quite vigorous. You will know (b) quite well, of course. A very jolly record.

★(a) **I Found You, (b) It's the Girl, Jack and Jill, 2s. 6d. ZONO 5977**

I like these two. Their singing is not good from a singing point of view, but they are distinctive, and that is at least something in their favour.

(a) **Just a Sprig of Ould Shamrock, (b) To You It's only**

**"Ireland," Denis O'Neil with Orch., rs. RAD 1571**

He sings both quite attractively, but I am not keen on either song as literature. I think he is too good a singer to waste time and energy on poor songs.

(a) **Kiss Me "Good Night," (b) When It's Sleepy Time Down South, Bob and Alf Pearson, rs. 6d. BRDCST 3126B**

Everybody seems to want to be kissed good night. This is the best version I have heard of it. Cheap at the price, too.

★(a) **Kiss Me "Good Night" (w.), (b) What's Gonna Hap-**



**Sam Browne**

**pen to Me? Sam Browne with orch., rs. 6d. WIN 5404**

Well sung and well recorded, this is well worth the price charged for it. I like (b) especially.

★(a) **Kiss Me Good Night, (b) Just One More Chance, Maurice Elwin, 2s. 6d. ZONO 5975**

Both these are now considerably overdone, but Maurice Elwin does them so well that I



**Maurice Elwin**

must in fairness recommend this disc. I wish they would all say or, rather, sing *chance* instead of *chancee*, making an unpleasant nasal tone that is contrary to the principles of good singing.

★**Layton and Johnstone Favourites, Layton and Johnstone (d.s.), 4s. COL DX306**

What more? *They* are favourites and they give you their favourites. So if you buy, you back a favourite! Get it!

★(a) **Life's Desire, (b) Many Happy Returns of the Day, Maurice Elwin, 2s. 6d. ZONO 6002**

His singing is always worth hearing. In this instance I am not in love with his songs—(b),

especially, is rather wishy-washy.

(a) **Little Love from You (f.), You Were Fooling Me (w.), Jenny Howard with orch., rs. 6d. WIN 5406**

The waltz is *not* for dancing to; in fact I think it is better to recommend—which I can certainly do—both as songs, with a certain amount of North-country humour. Quite original!

★(a) **Love Letters in the Sand, (b) You Forgot Your Gloves, Zonophone Salon Orch., 2s. 6d. ZONO 6005**

A very good orchestra. The bass on this record is remarkable. Quite outstanding, in my opinion.

★(a) **Makin' Faces at the Man in the Moon (f.), (b) Down Sunnyside Lane (f.), G. H. Elliott, with orch., rs. RAD. 1575**



**G. H. Elliott**

Delivered in his customary spirited style, both these songs are worth having, simply to hear him sing them. Very attractive and very inexpensive.

★**Negro Spiritual Melody, Paul Robeson and Jack Hylton and his Orch. (d.s.), 4s. H.M.V. C2287**

I expect there will be a great demand for this. Robeson has certainly chosen some favourite. *Swing Low, Black Sheep,*



**Paul Robeson**

and *De Gospel Train* are amongst them. He seems in good voice, too!

★(a) **Nellie Dean, (b) Silver Bell, Gertie Gitana with orch., rs. RAD 1576**

It is pleasant to hear her again. Her voice is not too good, but she has a method of delivering her songs that is attractive. Ask to hear it.

★(a) **Nevertheless, (b) I Love You in the Same Sweet Way, Mellow and Rich, rs. BRDCST 777B**

# HELPFUL REVIEWS by WHITAKER-WILSON

These two are always a safe investment. I like them here immensely. Ask for it at once!

**Old-time Music-hall Songs, Scala Singers and Players (d.s.) 2s. WIN L5398**

Quite well done. There are a good many old favourites. I think, all the same, that these old-timers are being a trifle overdone just now.

★**Songs Made Famous, (a) Vesta Victoria, (b) Mark Sheridan, 1s. BRDCST 776B**

Quite attractive. One forgets that certain well-known songs of this description in a sense belong to certain equally well-known singers. I think you will enjoy these; I did.

(a) **Time Alone Will Tell, (b) For the Sake of the Days Gone By, Billy Desmond, 1s. BRDCST 782B**

He sings well and the whole record is well produced. The songs are rather poor stuff, all the same.

**Tunes from 1914 to 1930, solos, chorus, and orch., cond. by Harry Bidgood (d.s.), 1s. 6d. BRDCST 3121B**

Quite a good medley. Chronologically, the proceedings begin at the *Soldiers of the Queen* and go on to *Land of Hope and Glory*, with everything you can think of in between.

(a) **Vienna, City of My Dreams, (b) Song of Songs, Terence O'Brien, tenor, 1s. 6d. BRDCST 3122B**

(a) you must know pretty well by now; (b) is rather a wishy-washy affair, though it has points that O'Brien himself makes. As a composition it is not too attractive.

(a) **Where My Caravan Has Rested, (b) Little Grey Home**



Aroldo Lindi

**in the West, Aroldo Lindi, 2s. 6d. COL DB662**

Very good—if you want them. If you do—why do you?

★(a) **You Didn't Have to Tell Me, (b) Smile, Darn Ya, Smile, Solemn and Gay, 2s. 6d. ZONO 5980**

The recording stands this in very good stead. The songs are rather hackneyed, but I think it would be hardly fair to S. and G. if I did not say unhesitatingly that their rendering is very good from every point of view.

(a) **You Used to Be My Sweet-heart, (b) They all Make Love but Me, Arnold Knight, bar., 1s. rd. PIC 851**

Not badly sung; his voice is

quite good, but the songs are rubbish. Still, ask to hear the disc. I do not wish to be unfair to it.

## MILITARY BAND

★(a) **Namuir March, (b) Bravest of the Brave March, Black Diamond's Band, 2s. 6d. ZONO 6008**

I think this will appeal to all lovers of military bands. It is very well produced.

## HUMOROUS RECORDS

**Buggines at the Pantomime, Mabel Constanduros and Michael Hogan (d.s.), 1s. BRDCST 780A**

Very good; every character is up to form. A very cheap shillingworth.

★**Columbia on Parade (d.s.), 4s. COL DX299**

*This is splendid.* All your favourite artists play and sing for you. Clapham and Dwyer, Flotsam and Jetsam, Billy Mayerl, Harry Tate, and others. A very entertaining show.

**Laughing Policeman's Christmas Eve, Charles Penrose,**



Charles Penrose

**Kaye Connor, and F. Hearn, (d.s.), 2s. 6d. COL DB667**

You need not laugh at this unless you want to; the people in the record laugh most of the



Kaye Connor

time, though what at, exactly, I did not discover. Very poor effort, Columbia!

**Liza and Bill at the Pictures, Ben Osborne and Nellie Perryer (d.s.), 1s. 6d. WIN 5403**

In these days, when people laugh at everything, this might possibly pass. It is rather low comedy, I think. I am afraid it does not appeal to me.

(a) **My Dear Old Grey-haired Mother, (b) I Must Have My**

## ABBREVIATIONS USED IN THESE PAGES

|        |    |                    |       |    |            |
|--------|----|--------------------|-------|----|------------|
| bar.   | .. | baritone           | IMP   | .. | IMPERIAL   |
| BRDCST | .. | BROADCAST          | orch. | .. | orchestra  |
| BRUNS  | .. | BRUNSWICK          | PHONY | .. | PHONYCORD  |
| COL    | .. | COLUMBIA           | PIC   | .. | PICCADILLY |
| com.   | .. | comedian           | RAD   | .. | RADIO      |
| con.   | .. | contralto          | sop.  | .. | soprano    |
| DEC    | .. | DECCA              | ten.  | .. | tenor      |
| d.s.   | .. | double-sided       | w.    | .. | waltz      |
| f.     | .. | fox-trot           | WIN   | .. | WINNER     |
| H.M.V. | .. | HIS MASTER'S VOICE | ZONO  | .. | ZONOPHONE  |

(a) and (b) indicate the titles of each side of a record.

'arf a Pint of Beer, Nat Travers, 1s. rd. PIC 852

I think the titles will give a clear idea of these two works. The coster part of the business is fairly well done. I do not imagine the disc will be a best seller.

(a) **My Irish Home, Matthew Haskins, (b) Maloney's Christening, Mattie Haskins and Mary Haskins, 1s. rd. PIC 862**

Buy this! You will not hear one single word in the opening noise. I say, Piccadilly! This sort of thing cannot appeal to much of a public, surely! Melt 'down the master, will you?

(a) **Nobody's Boy, (b) Not Me, George Crowther, com., 1s. rd. PIC 865**

Mr. Crowther is the comedian in the velvet suit; so it says



George Crowther

the label. Perhaps he was not wearing it when he recorded this. Anyhow, I cannot imagine it to be in his best style. I hope not, at all events, for I have not heard anything sillier for some time.

★(a) **Rhymes, (b) On a Cold and Frosty Morning, Bobbie Comber, com., with orch., 1s. BRDCST 781B**

(a) has a point of danger. I am not sure I quite care to recommend limericks of which the originals are not for publication. Still, I suppose it is humorous!

**Rhymes, Comedy Fox-trot, New Mayfair Dance Orch. (d.s.), 2s. 6d. H.M.V. B6090**

Rather disappointing if you are expecting a tasty last line to the last lines of the limericks; the whole of the last lines are cut. The tune, however, is

infectious. Otherwise there is not much in it.

**Sandy Buys a Greyhound, Sandy Powell, com. (d.s.), 1s. BRDCST 775A**

Quite amusing and characteristically vulgar. I say that



Sandy Powell

because I find all his records are afflicted that way. Having observed this, I now cast it into the column-labelled *Humorous*.

**Scenes of Domestic Bliss, Billy Caryll and Hilda Mundy (d.s.), 1s. 6d. BRDCST 3128A**

Not too clever, or elevating. I am not keen on these domestic wranglers. We know them to be on record, but why have them on records? So-called humorous!

## DANCE MUSIC

★(a) **Ali Baba's Camel, (b) Pagan Serenade (w.), Bidgood's Good Boys, 1s. BRDCST 779B**

Good, as Bidgood's Good Boys goods should be! A very good band.

★(a) **Begging for Love (f.), (b) Me (f.), Eddie Gross-Bart and his Cafe de Paris Band, 1s. 6d. WIN 5407**

To be recommended. Good singing and rhythmic playing are its chief features.

(a) **Carry On (six-eight), (b) I Found a Million-dollar Baby (f.), Howard Godfrey and his Waldorfians, 1s. rd. PIC 867**

The six-eighter is not very original; I do not dislike (b), but it is not American enough to justify its title. Otherwise no complaints.

★**Hits of all Nations, Dance Medley, No. 3, Debroy**

# YOUR CHOICE OF NEW RECORDS—Cont.



Debroy Somers

Somers Band (d.s.), 2s. 6d.  
COL CB372

I rather question the "All Nation" part of it, but they are certainly all hits. If you want a good dance medley you cannot do better than buy this one.

- (a) How's Your Uncle? (f.), (b) You Forgot Your Gloves (f.), Jerry Hoey and his Orch., is. rd. PIC 864

Neither of these strikes me as being particularly original. They are quite entertaining to listen to for a few minutes, but I do not imagine anyone could stand much repetition of them. We do want some original themes.

- (a) I Apologise (f.), (b) Many Happy Returns of the Day (w.), Howard Godfrey and his Waldorfians, is. rd. PIC 866

The first is rather a copy of other foxtrots with a similar sentiment about them. The waltz is not rhythmical enough to recommend for dancing purposes whatsoever merits it may be said to have as a piece of music.

- ★(a) It Always Starts to Rain (f.), (b) Jolly Good Company (f.), Rhythmic Eight, 2s. 6d. ZONO 5989

Good as they always are. Quite worth getting. You know both works, of course?

- ★(a) I Wanna be Loved by You (f.), (b) My Song (f.), Ambrose and his Orch., 2s. 6d. H.M.V. B6108



Ambrose

This is very well done. I always like his orchestra; here he is quite at his best.

- ★(a) Just a Blue-eyed Blonde (f.), (b) Twilight Waltz, Jerry Hoey and his Orch., is. rd. PIC 859

This is quite a good band. The singing is good also. I recommend the record as being useful for dancing.

- (a) Life's Desire (w.), Queen Was in the Parlour (f.),

Jerry Hoey and his Orch., is. rd. PIC 858

The first is quite a good waltz, though not particularly original in design. Still, I have heard far worse. (b) is one of the season's successes, apparently.

- ★(a) Love Letters in the Sand (f.), (b) Me (f.), Jerry Hoey and his Orch., is. rd. PIC 860

I like (b) immensely. I think it will be very popular. (a)



Jerry Hoey

is rather entertaining. I do not remember having heard either before.

- (a) Maybe It's the Moon (f.), (b) Two Little Blue Little Eyes (f.), Howard Godfrey and his Waldorfians, is. rd. PIC 868

(a) is one of the best tunes of recent days, in my opinion. I do not think much of (b), but if you have not already obtained (a) get this version. It is quite good and not ruinously expensive.

- ★(a) Me! (f.), (b) Joey, the Clown (f.), Bidgood's Good Boys, is. BROADCAST 785B

Very suitable for dancing. This is one of the best bands Broadcast records, in my opinion.

- (a) My Baby said "Yes, Yes!" (f.), I Found a Million-dollar Baby (f.), Harry Roy and his R.K. Olians, is. BROADCAST 787B

Quite worth listening to and rhythmic enough to dance to.

- ★(a) My Mother's Lullaby (w.), Percy Chandler and his Band, (b) I'm Keeping Company (slow f.), Jerry Hoey and his Orch., is. rd. PIC 854

(b) is quite good enough to mark for special attention. The waltz is also quite good.

- ★(a) My Sunshine is You (slow f.), (b) If I Didn't Have



Jack Hylton  
(See next column)

You (f.), Manhattan Melody-makers, is. 6d. BROADCAST 3130B

A very good specimen of their rhythmic art. This is worth having.

- (a) Oh! What a Night (f.), (b) Longer That You Linger in Virginia (f.), Harry Roy and R.K. Olians, is. BROADCAST 786B

Rather heavily recorded. This may prove to be an asset in a large room for dancing. If you want a good dance record with that quality about it you cannot do better than buy this.

- (a) On a Cold and Frosty Morning, (b) Life's Desire (w.), Jack Hylton and his Orch., 2s. 6d. ZONO 5994

Quite attractive, the foxtrot especially so. The waltz is a bit shaky and not too original. Not bad, not too good!

- ★(a) Over the Blue (f.), (b) 'Neath the Spell of Monte Carlo (tango f.), Jack Hylton and his Orch., 2s. 6d. ZONO 5996

(a) is well known; (b) is a good tango, and the playing well up to Jack Hylton's standard. The singing, moderate.

- ★(a) Piped Piper of Hamelin, (b) Hold My Hand (f.), Ray



Ray Noble

Noble and his New Mayfair Orch., 2s. 6d. H.M.V. B6112

A very good dance record; this is a good orchestra. I like (a) especially; there is some originality about it.

- (a) Smile, Darn Ya, Smile (f.), (b) Sing a Little Jingle (f.), Jerry Hoey and his Orch., is. rd. PIC 857

These are quite well done if you have not already bought them in another version. These records are very cheap.

- ★(a) Smile, Darn Ya, Smile (f.), (b) Call Me "Darling" (w.), Deauville Dance Band, is. RAD 1564

Very good for its price. These little discs by Edison Bell are steadily improving. This one is certainly well worth getting.

- (a) Spring Time Reminds Me of You, (b) Close Your Eyes, Billy Marlow, is. 6d. BROADCAST 3127B

A good voice. I think the dance-band voices are improving so far as records go. On the wireless it is another matter. Anyhow, this is good.

- ★(a) Sweet and Lovely (slow f.), (b) This is the Missus (f.), Jack Harris and his Gros-

venor House Band, is. 6d. BROADCAST 3131B

Both are very well done; this is one of the best of many dance records I have heard.

- (a) Sweet and Lovely (f.), (b) At Your Command (f.), Jerry Hoey and his Orch., is. rd. PIC 861

Not a very good version of (a); I have heard better. I do not particularly care for (b), though it has merits.

- ★(a) There's a Time and a Place for Everything (f.), (b) Sweet and Lovely (slow f.), Savoy Hotel Orpheans, 2s. 6d. COL CB376

Both are well done. They tell me here that (b) is one of the best tunes of the season. I ask you to believe them and not me in that case. I am not keen on it.

- ★(a) Tie a Little String Around Your Finger (f.), (b) For You (w.), Jack Leon and his Band, is. rd. PIC 853

This is the first time I have heard (a). I mark it as it is a very good tune; the words are also quite smart. Ask to hear it.

- ★Tunes of the Times, Jack Payne and his B.B.C. Dance Orch. (d.s.), 2s. 6d. COL CB371

A very good dance medley thoroughly suitable for occasional use; it is the sort of record you will play just now and then. Very well produced.

- ★(a) Twilight Waltz, (b) Song of Happiness (f.), Manhattan Melodymakers, is. 6d. BROADCAST 3125B

Quite an outstanding dance record in their very best style.

- ★(a) Way with Every Sailor (f.), (b) Over the Blue (f.), Howard Godfrey and his Waldorfians, is. rd. PIC 856

Quite a good dance record. I think Piccadilly might do well to keep everything up to this standard.

- ★(a) Who Am I? (f.), (b) You Forgot Your Gloves (slow f.), Jack Harris and his Grosvenor House Band, is. 6d. BROADCAST 3132B

Another good Harris band record. The recording is as good as any I have heard in the present batch.

- ★(a) Who Am I? (f.), (b) Linda (f.), Savoy Hotel Orpheans, 2s. 6d. COL CB377

These Orpheans are very good indeed. I recommend the disc for dance purposes; it is one of the best of this month's batch.

- ★(a) Who Am I? (f.), (b) There Must be a Bright Tomorrow (w.), Rhythmic Eight, 2s. 6d. ZONO 6019

Good recording and very rhythmic playing distinguish this attractive disc.

- (a) Who Do You Love? (f.), (b) Got a Date with an Angel (f.), Howard Godfrey and his Waldorfians, is. rd. PIC 855

Why not "Whom Do You Love?" Let us be grammatical in these things. Not a bad tune. The other is not particularly inspiring.

# The TRANSPORTABLE THREE



Completely self-contained except for aerial and earth—a "W.M." Technical Staff design that will give satisfaction



On the left is a Camco Fireside cabinet and on the right a Nustile model: the set fits in either



A GREAT advantage of the transportable type of receiver is that it is usually self-contained. In one cabinet there is the set, the batteries, the loud-speaker and, very often, the aerial. Such an assembly is particularly convenient to use. There are no straggling external connecting wires and the set can be moved about from room to room as desired.

### External Aerial

The Transportable Three described and illustrated in these pages is such a set, with one exception. It does not include an aerial, use being made of an ordinary outdoor or indoor wire. This practice has the advantage that a smaller number of valves can be employed for satisfactory results; an "open" aerial is always more efficient than the frame type.

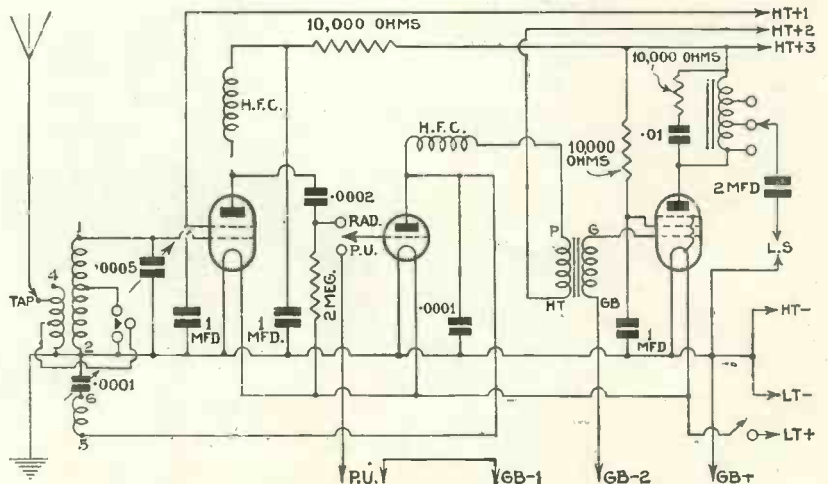
### Convenient to Use

It is largely because of the inefficiency of the frame aerial—and the need for using a large number of valves with it—that the transportable set does not enjoy greater popularity. But there is room for development of transportable sets using external aerials, for they are still sufficiently self-contained to be of considerable convenience in the house.

It is not easy to design a really efficient transportable set because of the limitations of space imposed by the cabinet. The pentode seems to be a solution: it does give great volume, but usually at the expense of excessive anode-current consumption, which means that an extra large high-tension battery must be incorporated—and usually such a battery cannot be fitted in a transportable cabinet!

It seems as though the designer is between the devil and the deep sea. He was until a pentode was produced that takes only 5 milliamperes at 120 volts: such a valve can be economically run from a standard size of battery. The valve referred to is the new Mazda Pen 220 and it has been incorporated in the Transportable Three.

If we add an efficient stage of high-frequency amplification and a



SIMPLE CIRCUIT WITH CHOKE-COUPLED SCREEN-GRID STAGE

The valve combination consists of a screen-grid high-frequency amplifier, leaky-grid detector and a transformer-coupled pentode

## THE TRANSPORTABLE THREE—Cont.

detector, we shall have a form of circuit that can be accommodated in reasonably small dimensions. The result of working on these lines is seen in the photographs that appear in these pages.

### Choice of Cabinets

Two alternative cabinets are shown: the set can be housed in whichever the constructor prefers, the internal dimensions being the same.

in for the long waves. Tuning is accomplished by the usual .0005-microfarad variable condenser, but to save space this is of the bakelite-dielectric type.

In the anode circuit of the screen-grid valve is a high-frequency choke. Signals set up current variations across this which are transferred to the grid of the detector valve through a .0002-microfarad coupling condenser.

It is desirable that the two chokes

should not be of the same type or self-oscillation will occur between the anode circuit of the screen-grid valve and the grid circuit of the detector—in other words, unwanted reaction will be experienced.

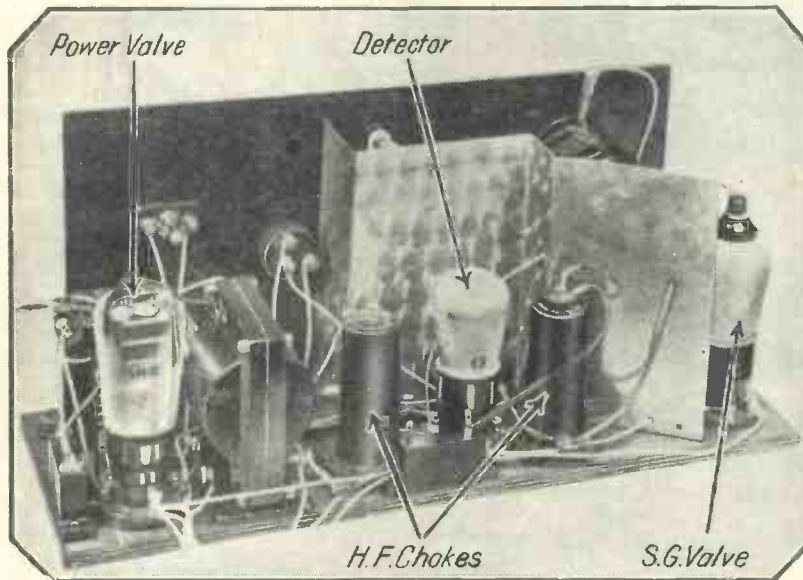
### Giving the Set Stability

The anode circuit of the screen-grid valve is supplied with a 10,000-ohm decoupling resistance and a 2-microfarad condenser to give stability in operation. The screen circuit of the high-frequency valve is provided with a 1-microfarad condenser to by-pass unwanted high-frequency currents.

There is nothing unusual about the arrangement of the detector valve. Quite standard values of grid leak and condenser are utilised. A .0001-microfarad by-pass condenser is connected between anode and filament to improve the efficiency.

### Quality of Reproduction

The transformer coupling between the detector and the pentode is also arranged in the standard way. Remember that the quality of reproduction will depend to a considerable extent on the low-frequency transformer. It pays to use a good-quality component here, one that will take a current of 3 or 4 milliamperes through the primary without saturating the core.



ASSEMBLED READY FOR BATTERIES TO BE CONNECTED

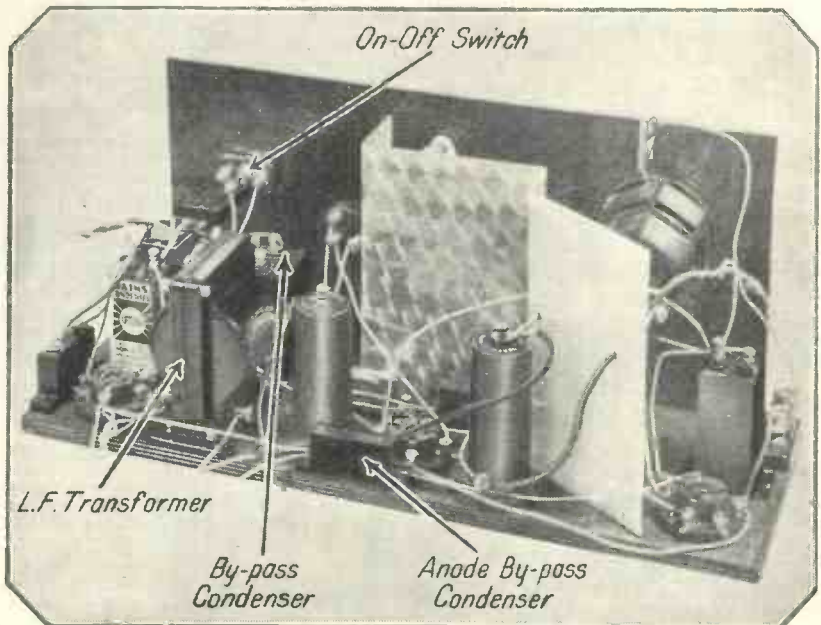
Here is the Transportable Three ready to be put in its cabinet and be connected to the batteries, loud-speaker and aerial-earth system

As it was desired to use standard commercial parts, there was some trouble in the choice of tuning coils and condensers. Finally, it was decided to use a choke-coupled stage of screen-grid amplification. This saves one coil and one variable condenser, while at the same time the stage can be made to pull its weight if arranged efficiently.

### Good Results Assured

The combination employed is therefore a choke-coupled screen-grid valve followed by a leaky-grid detector and a transformer-coupled pentode. The results are surprisingly good and the circuit can be recommended with every confidence that it will give excellent results, with economy of maintenance.

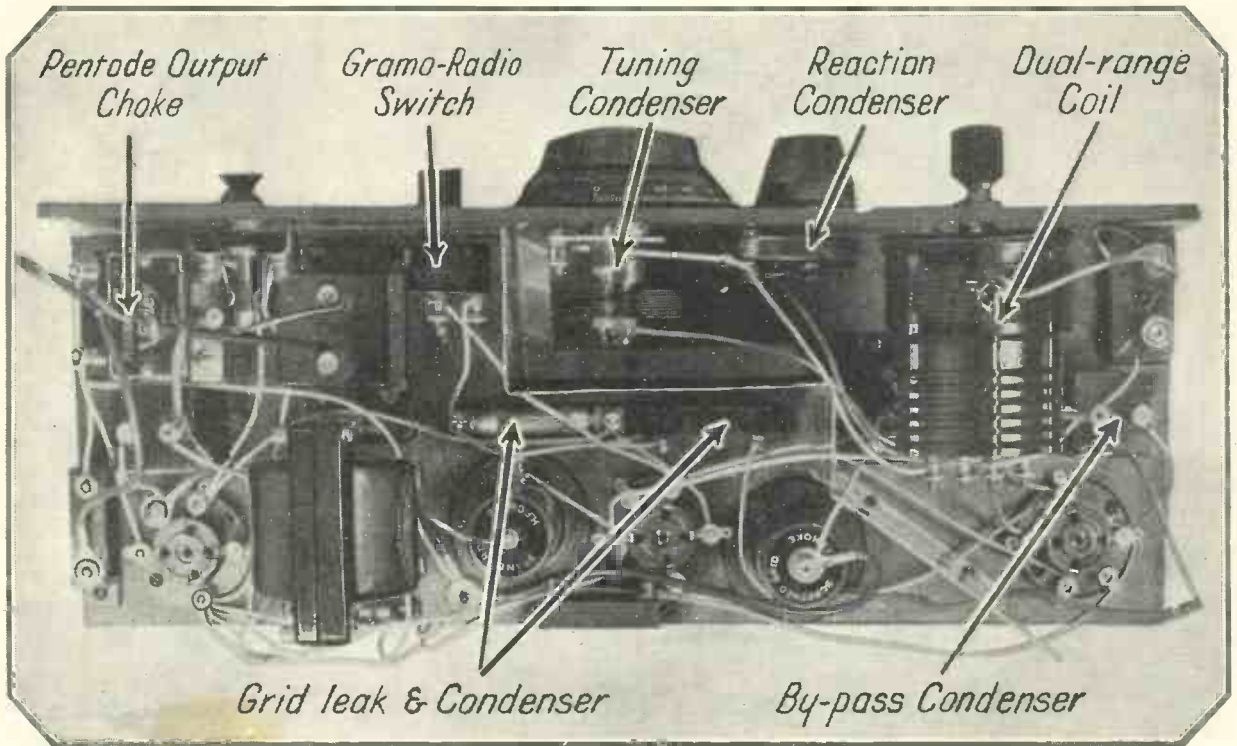
The tuning coil is of the dual-range type, fitted direct to the panel by a one-hole fixing device. The switch knob is pulled out for medium-wave reception and pushed



COMPACT DESIGN BUT EASY TO CONSTRUCT

Although the set is compact there is no difficulty about the construction. There is a choice of two handsome cabinets for the receiver

# SELF-CONTAINED EXCEPT FOR AERIAL



PLAN VIEW SHOWING DISPOSITION OF ALL THE COMPONENTS IN THE SET

Note the metal screen to shield the high-frequency circuits from the remainder of the apparatus. Two high-frequency chokes are used, but they must not be of the same types

Pentode valves are liable at times to instability, so to avoid any trouble of this kind in the Transportable Three a 10,000-ohm resistance and 1-microfarad condenser are included in the anode circuit.

### Special Output Circuit

It is also well known that a pentode needs a special output circuit to match it up with a standard high-resistance loud-speaker. For this purpose a tapped pentode output choke is included in the set. By

varying the point of tapping the best results can be obtained from any high-resistance reproducer. A tone corrector, comprising a 10,000-ohm resistance in series with a .01 microfarad condenser, is included in this output circuit.

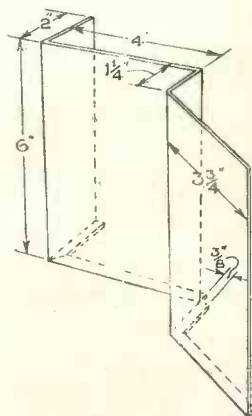
There is nothing else about the

good results without any trouble.

The actual assembly of the set is also simple. A standard panel and baseboard arrangement is employed, with a metal screen to shield the tuning circuit from the rest of the apparatus. Even the beginner will not find any snags in the construction.

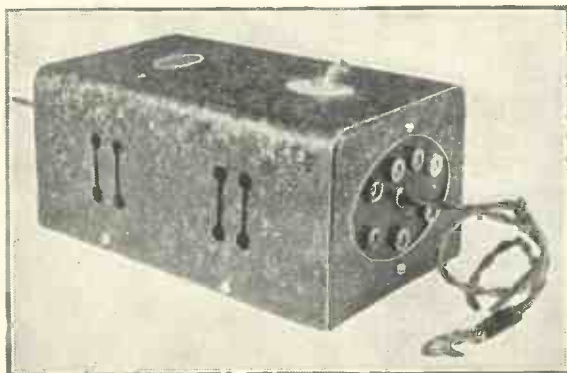
### Full-size Blueprint

Every essential detail is included in these pages, but if desired a full-size blueprint can be obtained for half price, that is 6d., post free, if the coupon on the last page of this issue is used by February 29. Address your application to "Wireless Magazine," Blueprint Department, 58-61 Fetter Lane, London, E.C.4, and ask for No. WM271.



METAL SCREEN

Dimensions of the metal screen for the Transportable Three



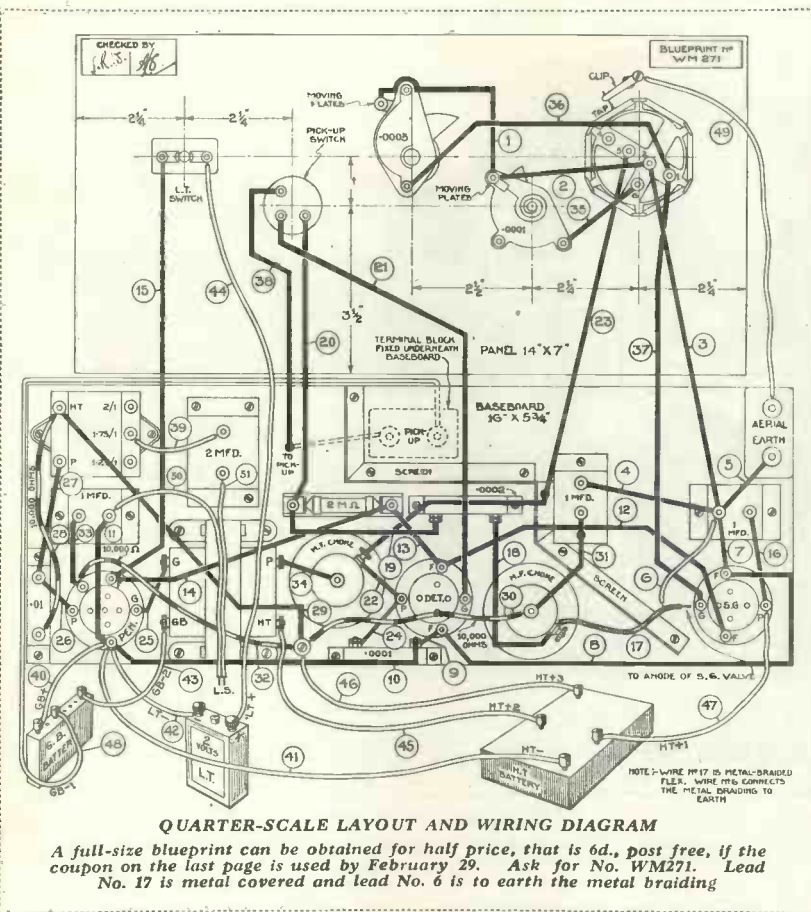
MAINS UNIT FOR HIGH TENSION AND GRID BIAS

This Tannoy unit gives high-tension and grid-bias supplies from A.C. mains; it also incorporates a trickle charger. It is suitable for use with the Transportable Three

circuit that needs any explanation. In essence it is quite straightforward and can be relied on to give consistently

It will be seen from a glance at the quarter-scale wiring diagram on page 72 that each wire is numbered separately. These numbers indicate the best and easiest order of making the connections, which should be put in position in the sequence thus indicated. If the numbers are crossed through

# THE TRANSPORTABLE THREE—Cont.



wavelengths. Volume is controlled (for radio reception) by the reaction condenser.

When records are being reproduced by means of a pick-up the volume is adjusted by means of an external control connected across the pick-up.

### Choice of Valves

There is no difficulty about the choice of valves for the Transportable Three. Any good screen-grid valve will be suitable for the high-frequency stage, while the detector should be of medium impedance—in the neighbourhood of 20,000 to 30,000 ohms. The pentode should be of the type specified, unless the operator does not object to an increased anode-current consumption.

There is space in the bottom of either of the cabinets for the Transportable Three to accommodate a mains unit for high tension. If this is also provided with a trickle-charging arrangement there will be no battery-maintenance troubles, except for occasional recharging of the grid-bias battery. A suitable A.C. mains unit is illustrated by the photograph on page 71.

The original set made by the "Wireless Magazine" Technical

as the connections are completed there will be no possibility of making a mistake.

The controls on the front panel are arranged in a most convenient way and they do all that can possibly be required.

On the left is the knob of the wave-change switch, the operation of which has already been described. Next comes the knob of the .0001-microfarad reaction condenser, which also, of course, acts as a volume control.

### Only One Tuning Dial

In the centre of the panel is the main tuning dial. Next to this comes a switch to adjust the set for ordinary radio reception or for gramophone-record reproduction (through the detector and the pentode). On the extreme right is the usual push-pull on-off switch.

From this description it will be realised that the Transportable Three is quite simple to work. There is only the main dial to be adjusted for the reception of stations on different

### COMPONENTS NEEDED FOR THE TRANSPORTABLE THREE

- CHOKE, LOW-FREQUENCY**
  - 1—Varley pentode Nichoke, 12s. 6d.
- CHOKES, HIGH-FREQUENCY**
  - 1—Bulgin standard, type HF2, 4s. 6d. (or Lewcos, Wearite)
  - 1—Bulgin S.G., type HF4, 5s. 6d. (or Varley, Peto-Scott).
- COIL**
  - 1—Tunewell dual-range Clarion 1931, panel mounting type, 10s. 6d.
- CONDENSERS, FIXED**
  - 1—Edison Bell .0001-microfarad, 6d. (or Magnum, Telsen).
  - 1—Edison Bell .0001-microfarad, 6d. (or Magnum, Telsen).
  - 1—Edison Bell .01-microfarad, 1s. (or Magnum, Telsen).
  - 3—Formo 1-microfarad, 7s. 6d. (or T.C.C., Dubilier).
  - 1—Formo 2-microfarad, 3s. 3d. (or T.C.C., Dubilier).
- CONDENSERS, VARIABLE**
  - 1—Dubilier bakelite .0005-microfarad, type SD5, 7s. 6d.
  - 1—Readi-Rad .0001-microfarad bakelite reaction, 3s. 6d.
- EBONITE**
  - 1—Becol 14-in. by 7-in. panel, 4s. 5d. (or Red Triangle, Perincol).
- HOLDERS, VALVE**
  - 3—Telsen four-pin, 1s. 6d. (or Lotus, W.B.).
- HOLDER, GRID-LEAK**
  - 1—Readi-Rad, 6d. (or Bulgin, Telsen).
- PLUGS AND TERMINALS**
  - 7—Belling-Lee wandler plugs, marked: G.B.+ , G.B.—, L.G.B.—2, H.T.—, H.T.+1, H.T.+2, H.T.+3, 1s. 2d. (or Clix, Eelex).
  - 2—Belling-Lee spade terminals, marked: L.T.+ , L.T.—, 4d. (or Clix, Eelex).
  - 2—Lissen terminal blocks, marked; Aerial and Earth, and pick-up, 2s. (or Clix, Eelex).
- RESISTANCES, FIXED**
  - 3—Bulgin 10,000-ohm spaghetti, 3s. (or Lewcos, Magnum).
  - 1—Dubilier 2-megohm grid leak, 1s. 9d. (or Telsen, Watmel).
- SUNDRIES**
  - Tinned-copper wire for connecting (Lewcos).
  - Lengths of oiled-cotton sleeving (Lewcos).
  - Length of rubber-covered flex (Lewcos).
  - Length of metal-covered cable.
  - 1—Peto-Scott metal screen, 2s. 6d. (or Parex, Readi-Rad).
- SWITCHES**
  - 1—Readi-Rad on-off, 10d. (or Telsen, W.B.).
  - 1—Bulgin rotary change-over, marked "Gramo" and "Radio", type S86, 2s.
- TRANSFORMER, LOW-FREQUENCY**
  - 1—Ferranti AF3, £1 5s. (or Telsen Ace, Varley Nicore 1).
- ACCESSORIES**
- BATTERIES**
  - 1—Pertrix standard capacity 120-volt, 15s. 6d. (or Fuller, Ever Ready).
  - 1—Pertrix 9-volt grid-bias, 1s. 6d. (or Fuller, Ever Ready).
  - 1—Pertrix 2-volt accumulator, type PAC2, 8s. 6d. (or Fuller, Ever Ready)
- CABINET**
  - 1—Camco Nustile transportable, £2 14s. (or Camco Fireside transportable, £2 10s.).
- LOUD-SPEAKER**
  - 1—British Rola permanent-magnet moving-coil, type PM1, £2 17s. 6d. (or Amplion, W.B.).
- VALVES**
  - 1—Mazda SG215 (metallised), £1 (or Cossor 220SG, Marconi S22).
  - 1—Mazda HL2 (metallised), 8s. 6d. (or Cossor 210Det, Marconi HL2).
  - 1—Mazda Pen220, £1.

The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower



## CHOICE OF TWO HANDSOME CABINETS

Staff includes a permanent-magnet moving-coil loud-speaker. If an alternative model, such as a balanced-armature reproducer, is to be utilised take care to see that it will fit into the cabinet without fouling the batteries in the bottom.

Although the set is otherwise self-contained, remember that it cannot be worked until an aerial and earth have been connected up. Any ordinary aerial will be suitable, but it should not be too large if the set is to be used close to a broadcasting station or the pick-up may be so great that interference is experienced.

In many localities an indoor aerial arranged round the ceiling will give sufficient strength of signals, but this is a matter for experiment.

### Moving the Set About

If indoor aerials are fitted up in several rooms of the house—say in the dining-room, sitting-room and main bedroom—the set can be moved about as required without any difficulty.

Although valves are

utilised, the results obtained from the Transportable Three are first-class and will satisfy everybody who builds it. We shall be glad to have reports from readers on its capabilities in their localities, for such information is of great help to the "Wireless Magazine" Technical Staff when considering designs for publication in future issues.

Many readers will be able to build the set at low cost, because some of the parts are likely to be already on hand. The cost of the additional components can be found from the specification.

consisting of a screen-grid detector valve, followed by a pentode output valve. The two valves will have to be resistance coupled, owing to the high impedance of the screen-grid valve. Or a parallel-feed transformer coupling might be used, with an anode impedance of about 250,000 ohms.

### Plenty of High Tension

Plenty of high tension will be necessary or the detector will not oscillate very readily on the lowest waves. Good tone, with plenty of volume, will mark this circuit as being a highly efficient arrangement.

## News of the Short Waves

WIRELESS has had to take the blame for many things in the present-day world—and short waves have in particular. The war correspondent takes his microphone with him and allows his audience to hear the snipers in their own homes.

Or will do very soon, for we read in the *New York Sun* that Floyd Gibbons, the noted American war correspondent, recently left for Manchuria and it is rumoured that he has taken a microphone with him.

### Making Us Pacifists?

Perhaps the sounds of warfare from other nations will help to make us a world of pacifists—or possibly it will provide a grand advertisement for war? Anyway, this "outside broadcast," if and when it comes off, should certainly be a thrilling affair.

There appears to be another battle going on now (no relation to the above-mentioned one!) between the owners of small and large radio receivers respectively. Many swear by their six- and seven-valve super-

heterodynes and others have plenty of words to say to those who could possibly imagine that more than two valves are ever necessary!

Actually, it's all a matter of taste—if you want really tip-top results with plenty of DX thrown in, a large number of valves is a necessity. If you are content to listen to the local station for the rest of your life, more than two valves would be sheer waste.

And it is the same on the short waves, only on a different scale. If you want really the very best results, with good tone and volume, then a multi-valve receiver is desirable. If, however, you don't intend going any further than a pair of headphones, then again, more than two valves would be sheer waste. Two valves of the correct type can be made to give really beautiful results on short waves and will, at a pinch, work a loud-speaker but this, again, is trying to stretch things a little too far.

Those whose interest lies in small receivers should try an arrangement

The Dutch short-wave stations appear to be dogged by bad luck or perhaps it is some form of political intrigue. Anyway, some months ago, station PHI at Huizen, Holland, formerly operating on 16.88 metres, closed down, owing, it was rumoured, to programme difficulties created by the various political parties.

Now, station PCJ, on 31.28 metres, has closed down for six months, there again being a suggestion of political reasons. PCJ was probably the most popular of all the short-wave stations and was certainly one of the first European short-wave stations actually broadcasting regular programme material.

### English Broadcasts

Formerly known as PCJJ, it helped to popularise short-wave radio in many parts of the world, particularly in our own colonies. A large amount of matter was broadcast in English. The station was easily recognisable by its cheery "five-language announcer," Mr. Edward Startz, whose linguistic abilities put many other short-wave station announcers to shame.

MANDER BARNETT.

## A WIRELESS RIDDLE

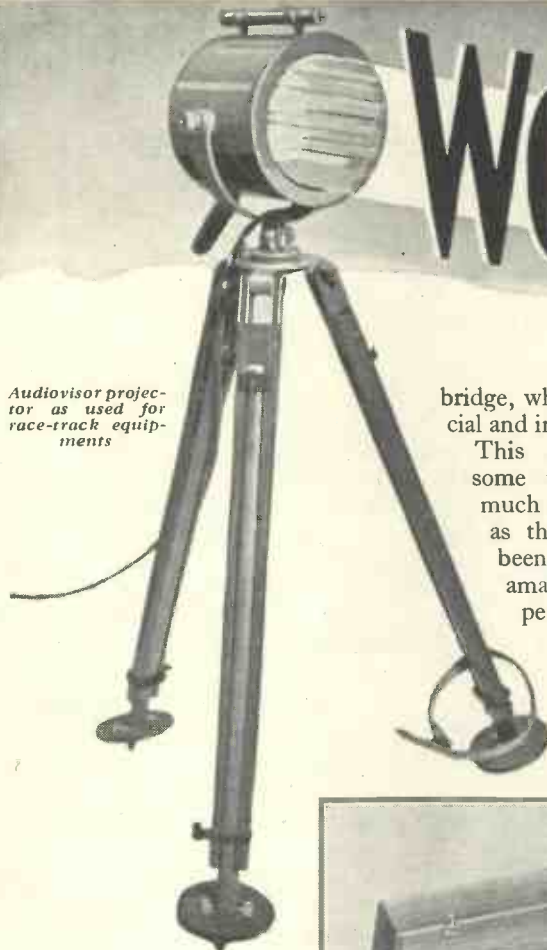
*Oh, here is a cry from the heart!  
Pray why did the wireless parts part?*

*Because—as the listeners bolted—  
The frisky young volts all revolted!*

LESLIE M. OYLER.

# WONDERS of

*Audiovisor projector as used for race-track equipments*



bridge, which has wide commercial and industrial applications.

This has been in use for some years, but recently a much cheaper version known as the Raycraft bridge has been developed for use by amateurs interested in experimenting with light control.

Before describing the simple Raycraft bridge, it will be of interest to note some of the most successful

Briefly, the cell or bridge consists of a base of ground glass, upon whose surface a gold-leaf grid is fused. This grid is formed of two interlocking combs, and the selenium in a molten state is spread over the surface, thus exposing the maximum amount of the element to light and avoiding as much as possible of the inert material not exposed to light.

### Argon-filled Bulb

The bridge is then inserted in a glass bulb, which is evacuated and afterwards filled with some inert gas, such as argon. After this the bridge is put through an ageing process, and is then ready to give reliable service.

It can stand up to as much as 1,000 volts if necessary. It can be made in all resistances from .5 to 250 megohms, and it will pass, in darkness, a current from 1 to 250 microamperes. The current change of a standard bridge of 4 megohms when taken from darkness to light is from 100 to 250 microamperes.

One of the most interesting advantages of the commercial selenium cell described above is the almost entire absence of time lag between a change of light and the corresponding change of resistance and therefore of current.

### Television and Talkies

This type of cell has been used in television and is used by some talking-film systems to convert the light variations on the film into sound variations through the medium of electricity.

By far the most important applica-

**S**ELENIUM is a light-sensitive element. This means that its ability to conduct an electric current varies with the intensity of the light shining upon it. The peculiar action of selenium was first noted by Willoughby Smith in 1872, at the cable station on Valentia Island. Some blocks of selenium had been used as high resistances, and the sun shining upon them decreased their resistance.

Thus are scientific discoveries made. It is rather curious how long the property of selenium remained unknown, for the element itself was discovered as early as 1817, by the scientist Berzelius.

### Selenium and Its Rival

To-day, selenium and a rival device known as the photocell are widely used. One of the most convenient forms of selenium, and also the most efficient, is the Radiovisor

commercial applications of the device, since it might otherwise be thought that selenium is only a scientific toy.

The first point to note is that there is all the difference in the world between selenium as found in combination with sulphur and the selenium cell typified by the Radiovisor. The big difference lies in the treatment and manufacture of the selenium.



*WORKED FROM THE ELECTRIC MAINS  
The Audiovisor bridge with relay and amplifier operated from the mains*

The "electric eye" is a common name for a light-sensitive cell, which may be either of the selenium or the photo-electric type. This article by ALAN HUNTER explains how light can be made to do work by means of the "electric eye". The principle is very simple—variations in light intensity are made to produce varying strengths of electric current

# the "ELECTRIC EYE"

tion of the Radiovisor bridge at the present time is for automatic switching, as in street lighting. The street lamps of Barnes and Maidstone are switched on when the daylight intensity falls below a certain value, and are switched off as daylight returns.

This control is quite simply effected by connecting the cell to one side of a relay, whose remaining contacts go to the switch mechanism.

## Automatic Counting

Automatic counting devices can also be arranged with the help of one of these cells. As the light source is interrupted, as by the passing of people through a turnstile, or manufactured articles along a mass-production chain, so the selenium will cause a relay to act and work the counter.

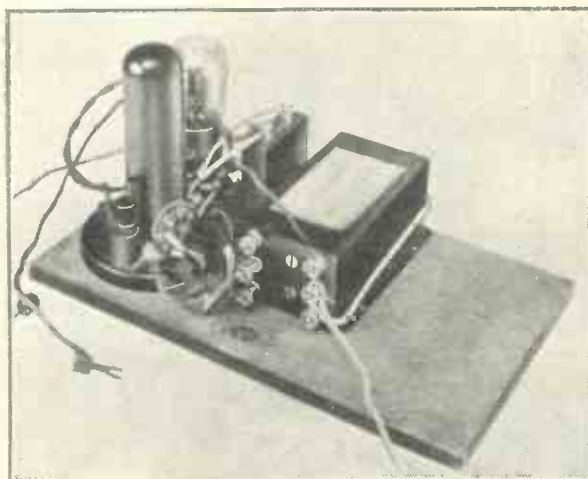
One of the latest applications of the bridge is for race timing. On the dog track at Wembley, for example, a beam of light shines across the finishing sector on to a Radiovisor connected to a relay timing system. As the dogs pass the winning post they interrupt the beam, which causes the selenium to act on the relay, thus providing a foolproof check, far more accurate than any human agency.

A similar appli-

cation is used for motor speed trials. The accuracy possible by this means is recognised by the R.A.C. and other official bodies.

Probably the most startling use of the bridge is for burglar alarms. Not so long ago the public was intrigued by the invisible-ray protection given to the priceless jewels of the Shah of Persia at the International Exhibition of Persian Art held at the Royal Academy in London. An infra-red ray of light was focused on a Radiovisor bridge, connected to a relay, which would ring a bell every time the beam was interrupted.

For country houses, factories, warehouses and banks the invisible-ray burglar alarm has obvious advantages. Some quite elaborate



**RAYCRAFT KIT FOR CONSTRUCTORS**  
This photograph shows the Raycraft kit for light-control experiments in the home



Special Audiovisor cell as used for race-track equipment

devices, such as red lights and alarm bells, are worked with the Radiovisor bridge.

## Raycraft Bridge

I come now to the Raycraft bridge, which forms the basis of the Raycraft kit available for the amateur at the reasonable price of £3 17s. 6d. Made by Audiovisor, Ltd., the Raycraft kit consists of a Raycraft bridge, namely, a smaller edition of the well-known commercial Radiovisor, a Raycraft relay, and the component parts for a one-valve amplifier. With the blueprint supplied

# WONDERS OF THE ELECTRIC "EYE"—Cont.



**TIMING THE DOGS AT WEMBLEY**

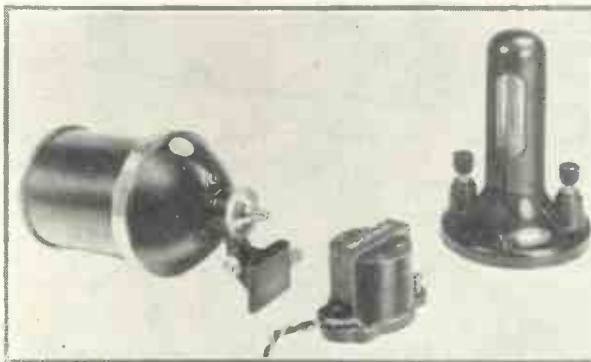
*This is the gear installed by Audiovisor at the Wembley dog track. It is used for timing the winners*

with the kit I found it easy to assemble the relay and amplifier parts according to the circuit shown by the diagram reproduced herewith. It will be seen that the selenium cell is connected in series with a variable high resistance across the high-tension supply. The relay is connected in the anode circuit of the amplifier valve. The electrical variations set up by the cell's varying response to the light source are impressed on the grid of the valve, and amplified.

The consequent change in the anode current then causes the relay contacts to make or break, and any externally connected mechanism, such as an electric bell, will be set in motion.

With a 120-volt high-tension battery the total anode-current consumption of the Mullard PM2DX

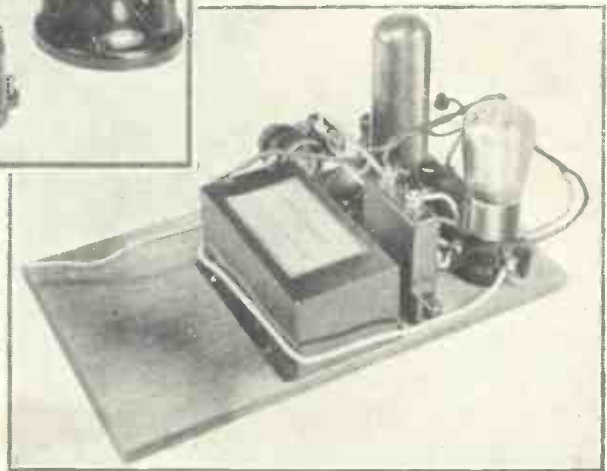
valve specified is only 2 milliamperes. For mains users an all-electric amplifier is in process of being designed, and will probably be



**THE RAYCRAFT KIT**

*(Above.) The projector, with suitable mains transformer and light-sensitive cell.*

*(Right.) Another view of the completed kit, which is very simple and straightforward to assemble if the blueprint is carefully followed*



available by the time this is read.

The contacts of the relay are arranged in such a way that a change of light will either make or break the external contacts, or will momentarily alter them.

## Ringling A Bell

Arranged in one way, the relay will cause a bell to ring when the light is changed. Another way will stop a bell from ringing. A third way will cause the bell to ring only while the light is being changed.

I have tried all three ways with an ordinary electric bell, and I must say there is absolutely no appreciable time lag between the change of light and the relay action. The sensitivity of the cell is readily varied by the resistance, and once the most sensitive point has been found there is nothing to go wrong.

The most amusing experiment I made with the Raycraft kit was to work the relay with an invisible ray. A special Raycraft projector is available at £1 2s. 6d., fitted with a filter that "kills" the visible light produced by the electric bulb, but allows the infra-red light, which is invisible to the eye, to pass through.

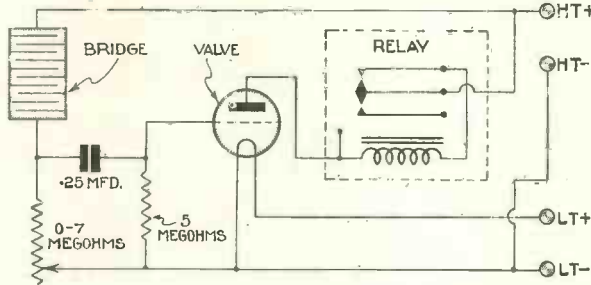
## Burglar Alarm

By focusing this beam of infra red on the Raycraft bridge, you can arrange a very complete burglar alarm. I connected up the electric bell in the relay circuit, so that when the invisible beam was interrupted the bell started to ring continuously. Fairly careful focusing was needed to bring about this sensational effect, but once set there was no difficulty in repeating the stunt.

# HOW TO MAKE LIGHT DO WORK

I think many wireless amateurs should be interested in this Raycraft kit, for it provides a simple and inexpensive means of learning some of the elementary things about light control. Whether such a study has the future predicted by the Raycraft people remains to be seen.

sible to detail them all in this article. Much depends on the originality of the user of the kit. Obvious uses, such as opening a garage door as the light of the headlamps shines on the cell, and starting up the radio set as the light of the room is switched



**CIRCUIT OF THE RAYCRAFT RELAY UNIT**

*This diagram shows the simple circuit used for the Raycraft light-control unit which can be used for all kinds of interesting experiments*

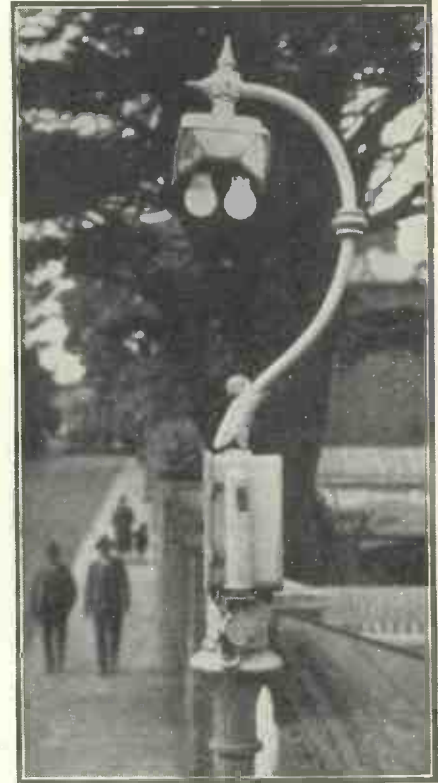
Although the Raycraft kit has been produced for amateur use, it must not be thought that the bridge incorporated in the kit is only a toy—it can be applied to serious work, subject to the limitations of the relay.

The uses of the Raycraft kit are so numerous that it would be impos-

For some time it has been assumed that selenium is no longer any use, the assumption being that photo-electric cells have ousted selenium. Recent experiments show that selenium, when treated, as in the Radiovisor and Raycraft bridges, is still useful.

on—these are but two of many “stunts” that have actually been tried successfully.

Meanwhile the kit can be entirely recommended to readers anxious to explore the possibilities of selenium in a highly commercialised and efficient form.



**LIGHTING THE LAMPS AT MAIDENHEAD**  
*When daylight falls below a certain intensity the relay comes into operation and works a switch. The light-sensitive cell is seen at the base of the curved arm*

## Radio Aids International Police Work

THE police authorities of most nations have realised the utility of wireless transmission and already in many European centres special stations have been erected for the purpose of establishing rapid two-way communication between the capital and branch headquarters, with flying squadrons of armed police and with provincial cities.

### London Radio Calls

The daily Press in this country frequently mentions cases in which such calls have been successfully made to police motor vehicles patrolling the streets of the Metropolis.

In a recent report issued by the State of Indiana (U.S.A.) documentary proofs were put forward to demonstrate that over a period of six months some 2,300 arrests had been made possible by messages transmitted on short waves from central police headquarters in Indianapolis.

Similar services have recently been established in New York, San Francisco, Chicago and other American cities.

In Europe, with a view to collaboration with Paris, London, Vienna, Prague and Budapest, a central police station has been erected at Berlin; sub-stations have also been installed in the foremost German cities, as for instance, Munich, from which centre listeners may hear transmissions on 1,340 metres twice daily, between 7 and 8 a.m. and 7 and 8 p.m.

Experiments are also being carried out with the wireless transmission of photographs, etc., on the Korn system, a principle corresponding in many ways to that worked by the French inventor, Bélin.

Budapest possesses a short-wave transmitter working on channels between 15 and 90 metres, and suitable for both telegraphy and telephony broadcasts; also, in addition,

a universal receiving apparatus capable of picking up all transmissions from 15 to 4,000 metres. The towns of Szeged, Debrecen, Szekesfehervar and Szombathely have been equipped with 100-watt transmitters. Throughout the country the authorities have distributed over 230 receiving sets which have been installed at the small police headquarters.

### In France

Finally, at the Paris Ministère de l'Intérieur (Home Office) a special 2-kilowatt plant has been erected; it can be used by the authorities for telegraphy, telephony and for the transmission of photographs (finger prints, etc.) by the Bélin system. The range of the apparatus covers 30 to 90 metres and from 300 to 1,400 metres. Recent tests have been carried out on 10.5, 11.4, 12, 44.75, 59 and 84 metres. No definite wavelengths have been adopted. GRIDDAS

# The First Musical Bolshevist

LUDWIG VAN BEETHOVEN



**L**UDWIG VAN BEETHOVEN was by no means an amazing genius in his younger days. According to his own account, he was not greatly interested in music as a child.

His father, when he chanced to be sober—which was not often—certainly took some interest in him, but it generally amounted to forcing him to practise long hours; a cane reposed on the piano, the weight of which Beethoven knew only too well.

## Making Some Money

I imagine that Johann Beethoven thought that there was a chance of making some money out of a child prodigy, much as Mozart's father had done; Mozart's father was everything in the world to his son. Beethoven was eventually given his father's salary to keep for him, as he was incapable of dealing with money matters.

The story of the meeting of Beet-

hoven and Mozart has been told in many ways. Most of what has been given seems to me to be grossly exaggerated. At all events, it cannot all be true. I propose to tell the story simply.

It appears that Beethoven decided that he must go to Vienna if any thought of success was to be entertained. He arrived with none too much money in his pocket, but determined to make his name. He knew that Mozart was there and decided that he could do worse than pay the master a visit.

Mozart was then at the height of his career. Beethoven made all his decisions quickly, and rarely altered them; it was so in this case. He simply called on Mozart and asked if he might play to him. Mozart listened and came to the conclusion that Beethoven was not improvising, as he said he was, but was merely reproducing something he had learned from memory.

Beethoven was furious at Mozart's indifference. He practically demanded a theme to be given him. Mozart replied by choosing one that would require some handling to make effective. Beethoven's performance was such that Mozart tip-toed out into an adjoining room where some friends were seated, saying something to this effect: "Pay attention to this young man; one day he will make a noise in the world."

Those are the bare facts. It is a charming scene—it has even found

its way on to canvas—and there is a good deal behind it.

Beethoven's first lodging in Vienna was virtually an attic over a printer's shop, but he found something more suitable a little later on.

He went to Haydn for lessons in counterpoint for which he paid eight *groschen*, a modest sum of 9½d. The lessons were taken at Haydn's house; no less than 245 specimens of Beethoven's early work have been preserved, of which it seems that Haydn personally corrected forty-two.

## Strenuous Lessons

I am inclined to think that Beethoven was more than the gentle Haydn could successfully cope with; I am quite sure that the lessons were decidedly strenuous.

Haydn was inclined to be perfunctory in his methods of correction; he seems to have suggested to Beethoven that such and such were the rules of counterpoint, that they had been good enough for Bach and Handel, and that they should be good enough for him.

Beethoven, on the other hand, was a revolutionary and strongly disinclined to take for granted anything that he could not understand.

He required an explanation—a detailed explanation at that—for every little point. I think Master Beethoven extracted his full 9½d. worth out of those lessons!

Later, he went to Albrechtsberger, a very academical musician, and fared only a little better.

## Connecting Link

You should regard Beethoven as being the connecting link between strictly classical and the modern in music.

What we call modern in these days is another matter, of course; Hindemith, Bartok, and all the other futurists have made a classic of Beethoven; but from the historic point of view, Beethoven might be loosely described as the first musical Bolshevist.

Such a thought reminds me of his amusing characteristics. Rarely has there been a greater character than Beethoven. He was known far and wide in Vienna for his eccentricities, but he was adored and revered by the whole populace.

### His Acid Temper

His acid temper was something to marvel at, and his friends suffered from the effects of it in turn.

However, I personally sympathise with him when he played a duet with Ries at the house of a certain Count Browne and was disturbed by a brainless young nobleman who carried on a conversation with a lady guest in a loud voice.

Beethoven suddenly knocked Ries' hands off the keys. "I play no longer for such hogs," he roared, white with rage. Dead silence followed naturally, but Beethoven could not be persuaded to play again.

At the same time, he could be very rude with far less provocation.

When *Leonora* was being rehearsed he was furious because there was no third bassoon present. Prince Lobkowitz, who was really a great friend, sought to make light of the matter.

"You have two bassoons, Ludwig," he said, "you can do without the third for once."

### Beethoven's Disgust

Beethoven turned away in disgust. He need not, however, have taken the trouble to cross the Platz to the Prince's palace, after the rehearsal was over, and shout up the entrance :



HAVE YOU HEARD HIM?  
Felix Aylmer is a well-known actor and  
broadcaster

## IF—

(With apologies to Rudyard Kipling)

If you can build your set when others doubt you  
And lazily buy theirs complete for cash ;  
If you can gather wires and screws about you  
And build the outfit neatly in a flash ;  
If you can hold an overheated iron  
And solder up the joints without a curse,  
Or pinch your thumb and grumble like a lion  
And only mutter "D—— !" and nothing worse.

If you can labour long into the small hours  
And study blueprints restlessly till dawn ;  
If you can work upon your set at all hours  
And yet not look too fatigué, or worn ;  
If you can toil and never waste a minute,  
Finding the whole proceeding lots of fun,  
Yours is the ether, and everything that's in it  
And—which is more—you'll be a "fan" my son !

C.P.P.

"Lobkowitzeresel" (Ass of a Lobkowitz).

Sometimes those who knew him best would beg him to improvise, and when he churlishly refused would carry him by force to the piano, only to see him bang the keys with his fists.

Then his mood would change, and his fine, rugged face would light up with a smile, and he would play for hours at a stretch, often moving them to tears.

How the aristocracy of Vienna endured his dreadful manners is a mystery. His table manners would have shocked a savage, yet there was not an aristocrat in the city who could resist the fascination of his personality.

Several of them were his pupils; his lady students either went to his humble lodging for their lessons or sent their carriages for him to visit them—as he chose to direct.

Any inattention meant having one's ears boxed and the music torn up and thrown about the room.

### The Comforter

It is said that in Madame Ertmann's drawing-room he used the candle-snuffers as a toothpick; it is also said that when her only child died and she was prostrate with grief, it was Beethoven who comforted her in a most spiritual manner. She

mentioned the matter to Mendelssohn some years after.

Beethoven dressed abominably. Ries says that he had to shave up to his eyes; he certainly cut himself every time he used a razor.

Moscheles says that no one could persuade him that if he persisted in undressing before the open window it was bound to attract attention. This simple piece of reasoning was put before him when he asked what "those damned boys were hooting at."

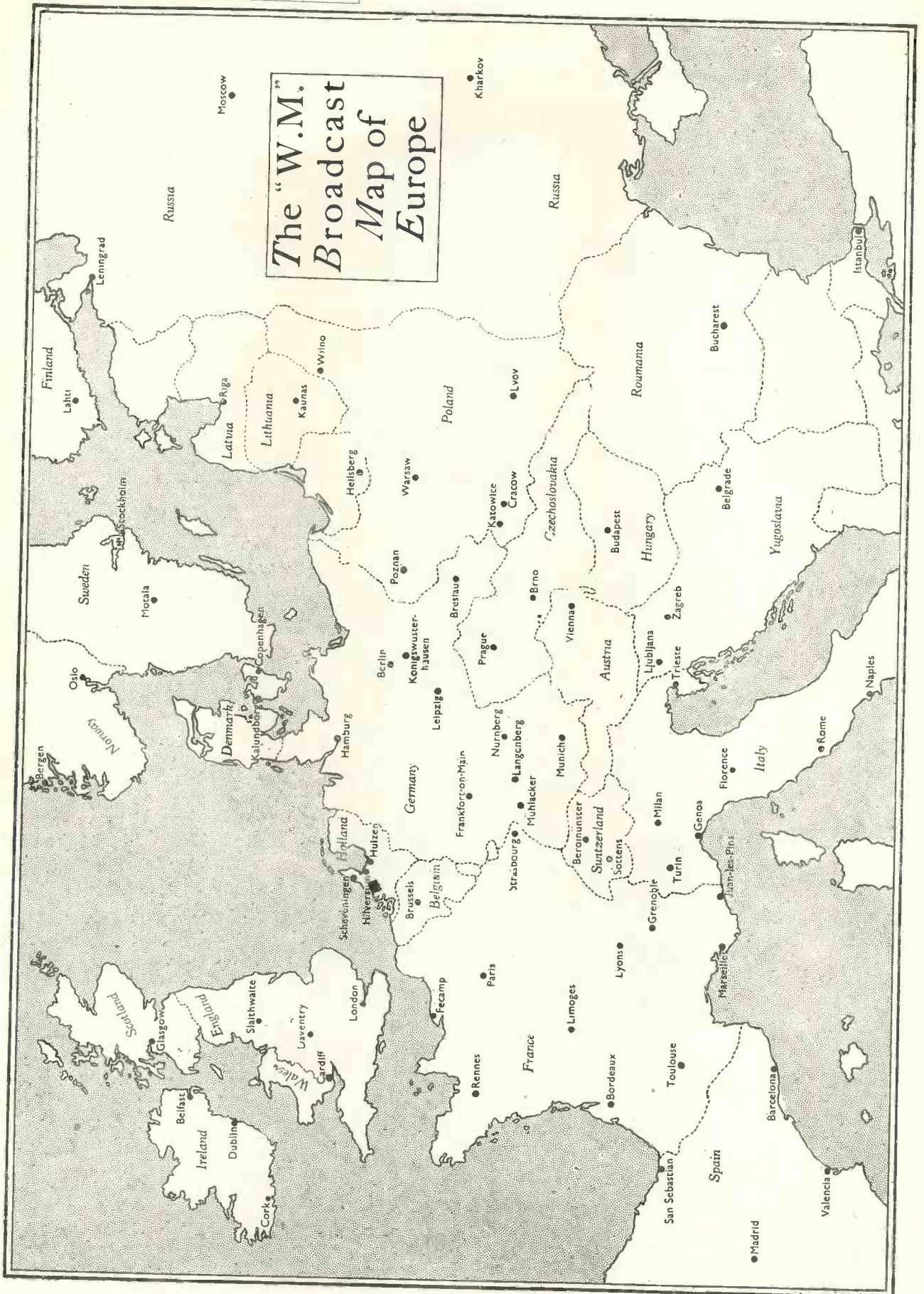
### Plans for the Future

His last hours were spent in making plans for the future. There was to be a tenth symphony—for England. The Philharmonic Society had sent him a hundred pounds when he needed it, and he wanted to reply.

He died on March 26, 1827, during a violent thunderstorm. His last action was to raise himself up in bed and shake his fist at the lightning.

His funeral was a wonderful sight. Twenty thousand people witnessed it, and it took two hours for the cortege to pass from his house to the church, a distance of a few hundred yards. Schubert was one of the pallbearers.

Thus passed one of the most human of the great masters. He has gone, but his music remains for all time.









A LIGHT OPERA STAR

An artist who made her name in the Continental version of "The Beggar's Opera," Baroness Luit Hohenberg has been heard in recent vaudeville programmes

SO, after nearly three years, the Sunday afternoon performances of Bach's church cantatas have stopped. During this time 106 different cantatas and 72 repeat performances have been broadcast.

### Don't Applaud Too Soon

The low-brows must not applaud too soon. The B.B.C. state that the present financial conditions, which have necessitated programme economy in certain directions, have caused the stoppage, but it is "earnestly hoped that improved conditions may enable a resumption after a year or two."

Perhaps we shall be more appreciative after a long rest.

# Music to Listen For

## IN THE NEW YEAR

A choice assortment of music, both old and new, will be heard in the Queen's Hall symphony concerts to be broadcast during February.

The first concert, on February 3, will be conducted by Nickolai Malko, the Russian conductor, who has frequently appeared in the London studios. Tchaikowsky's "Fifth," a delightful symphony, is undoubtedly the most attractive composition down for performance that evening. Even the most "hard-to-please" listeners should enjoy this beautiful example of this popular composer's music.

I will not forecast a similar treat to those who listen to the *Concerto in D*, for violin and orchestra, by Serge Prokofiev, which will also be played. The soloist in this work will be Szigeti, the Hungarian violinist.

Compared with the Tchaikowsky symphony, this work will appear rather discordant and crude. It is hardly a good choice on the part of the compilers to include both these works in the same programme.

It is interesting to note that negotiations are in progress with Serge Prokofiev to arrange a visit to this country in order that he may play the solo part in his *Concerto No. 3*, for piano and orchestra, which will be performed at a symphony concert next April.

The first British performance of a new work by Arnold Bax, *Winter Legends* (Symphonie Concertante, for piano and orchestra), will be

heard in the second concert of the month, on February 10. The solo pianist will be Harriet Cohen.

### Pleasing Melody

Bax's music, unlike most modern music, does contain a good proportion of melody. It is vividly descriptive and very pleasing to the ear. Make a point of listening to this example of Bax's music; it will be worth while.

One of John Ireland's most famous compositions, the symphonic rhapsody, *Mai Dunn*; Brahms' *Concerto in D*, for violin and orchestra; and the overture to King Stephen, by Beethoven, complete the programme of a notable concert. The soloist in the Brahms' concerto will be Adolph Busch, violinist.



A Russian singer known as "The Singing Pilot," George Seversky has been heard in variety concerts from London

Sir Henry Wood is to conduct a well-varied programme, ranging from

Handel to Hindemuth, in one of the best concerts of the season on February 17. Maggie Teyte, the famous English soprano, will sing the solo part in Maurice Ravel's three melodies for soprano and orchestra, *Scheherazade*. This composition is what might be called a good example of a musical "character study."



Ben Williams, the famous Welsh tenor, has recently broadcast from Belfast. He took the part of Faust in the first relay of the Carl Rosa Opera Company

*Konzertmusik*, for strings and brass, by Hindemuth, will receive its first performance at this concert. I do not recommend Hindemuth's music as being ideal for the microphone. It would be far better left alone.



Doris Gilmore, a clever young actress who was heard in the Christmas show, "Pantomimetry." Miss Gilmore is also a qualified chemist's dispenser



An early broadcaster from the Birmingham station, Alice Vaughan is a pupil of Sir Henry Wood. She broadcast recently

This concert concludes with Marcel Dupre, the eminent organist of Notre Dame Cathedral, Paris, playing the solo part in the *Concerto for Organ and Orchestra*, by Handel. The right man has been chosen to play this concerto. I shall expect to hear a good rendering.

A great surprise is in store for lovers of chamber music. The Lerner String Quartet is to make its first broadcast appearance in this country on the National wavelengths on February 7. This is a date worth making a note of.

The Sunday evening concert at



A well-known conjurer and variety artist, Louis Hertel broadcast as early as 1923. He was heard recently in London vaudeville programmes



One of the best of broadcast contraltos, Doris Owens was heard in "Memories" arranged by Joseph Lewis

No. 10 studio, to be broadcast on February 21, will be relayed to nearly the whole of Europe. A series of international exchanges of concerts is being arranged by the International Broadcasting Union at Geneva and is to take place this year. Recently we have heard concerts



Singer, conductor, organist, and choir-master, Reginald Morgan is a frequent broadcaster in Midland Regional programmes

in this series from Belgium and Austria. One or two have been missed in this country on account of faulty landlines in the outlying parts of Europe.

The British concert, conducted by the B.B.C.'s musical director, Adrian Boult, will be an all-British concert. Amongst the works to be performed

## MUSIC TO LISTEN FOR—Continued



Samuel Kutcher, a brilliant virtuoso violinist, was recently heard with his quartet in the Foundations of Music series

are Sir Edward Elgar's *Enigma Variations*, Holst's *Fugal Overture*, and *Brigg Fair* by Delius.

A concert from Sweden is one of the next to be arranged. This will be broadcast throughout this country providing the landline between Sweden and Berlin is suitable for carrying the frequency range required. The landline between Berlin and London is quite new and suitable for the transmission of music.

A new experiment in broadcast dance music is being carried out by the leading dance bands in co-opera-



Anna Fillipova, the famous Russian operatic soprano, will be broadcasting again shortly. She is also a brilliant pianist

tion with the B.B.C. All the leading bands are coming to the studio at the rate of about one a month, in order that they can be heard by listeners to the best advantage. When these bands are broadcasting from their respective clubs and hotels, their music is often spoilt by a background noise of people chattering.

Quite recently we have heard the Savoy Orpheans and Geraldo and



Trefor Jones, a young Welsh tenor, is known for operatic singing as well as his studio broadcasts

his Gaucho Tango Orchestra from the studio. What a difference! I am inclined to think that it would be better if outside broadcasts of dance music were reduced to a bare minimum and studio performances substituted.

The next outside band to broadcast from the studio will be Ambrose and his Orchestra, on January 22.

It will be interesting to compare the performances of outside orchestras with Jack Payne and his band under similar acoustic conditions.

### Studio Acoustics

Although it is not strictly within my province to comment on the technicalities associated with broadcasting, a very noticeable difference between the London and Manchester studio acoustics has attracted my attention. Did you hear Jack Payne's band broadcast from Manchester some little time back? Undoubtedly Manchester engineers know how to make a dance band sound well. Every instrument was clear and dis-

tinct. I wonder if any other listener has noticed the difference?

Some interesting programmes have been arranged for the next few weeks.

Gordon McConnell, one of the best radio revue producers, and Christopher Stone are to produce a revue, *New Songs for Old*. Both these men are well known in their respective jobs for giving only the best. Their joint efforts should produce a show a little bit out of the ordinary. *New Songs for Old* will be broadcast on January 26 and 27 on the National and Regional wavelengths respectively.

Joseph Lewis is presenting another of his enjoyable concerts at 9 p.m. on January 28. This time it will consist of excerpts from the popular operas.



Claud Biggs, a well-known classical pianist, who has given recitals at many London concert halls prior to broadcasting

Since his transference from Birmingham to Savoy Hill, Mr. Lewis has done a great deal in brightening the light-orchestral broadcasts. He is one of the few at Savoy Hill who know what the ordinary listener wants and appreciates.

I am sure that most listeners are enjoying the new series of orchestral concerts which is being arranged and conducted by Victor Hely Hutchinson. Some of the best and most tuneful of the older classics are chosen for the programmes. The next concert of the series, entitled "Serenade," will be broadcast on February 6. T. F. HENN.

# The 1932 A.C. SUPER 60

Here is the set in a Camco Waverley Junior radio-gramophone cabinet

A really sensitive and selective receiver that can be relied on to bring in dozens of stations wherever it is used. The power output is in the neighbourhood of 2 watts and is adequate for all ordinary needs. Provision is made for switching in a pick-up and only a short indoor aerial is needed for good results. Certainly a set for 1932



SUPER RECEPTION WITHOUT BATTERY TROUBLES ALL THE YEAR ROUND!

**T**HIS receiver may be considered as the battery 1932 Super 60 modified for A.C. mains working. The layout of the parts has been changed in order that the new parts shall be in suitable positions, but the baseboard is of the same size as that used in the battery model.

All circuits are supplied from the rectifier and power transformer. The transformer has four windings. One is the primary and it is tapped for various mains voltages. The secondary winding provides 250+250 volts at 60 milliamperes for the two anodes of the full-wave rectifying valve.

### Low-tension Windings

The filament of the rectifier is heated from a 4-volt 1-ampere winding having a centre tap and the valves themselves are heated from a 4-volt 6-ampere winding, also having a centre tap.

A transformer of fair size is used in order that heating of the windings shall not occur during use and the

one used is satisfactory in this respect.

A further point is that the windings must be carefully insulated; a failure in the insulation would be followed by a breakdown in the transformer and the valves might be destroyed. It is necessary that a well-made component be used, as this is an important part of the set.

The output from the rectifier is smoothed by two condensers of 4 microfarads each and a choke. Condensers of the right type must be used here as the working voltage is over 200 volts and at times the voltage may be well over 300. These special condensers are well worth the extra cost as compared with the ordinary types, which might soon break down if used in the rectifier circuit.

From the rectifier and smoothing circuit we obtain a supply of over 200 volts at 50 or 60 milliamperes, the output being so smooth that further filtering is not required.

The circuit diagram shows that we

have a band-pass aerial circuit tuner connected to the first valve, which is a double-grid type. The grid is biased by the 3,000-ohm resistance included in the cathode circuit. A 1-microfarad condenser shunts the resistance.

### Negative Grid Bias

There is passing through this resistance the anode-circuit current of the first valve only and the grid is biased to a negative voltage of sufficient amount to avoid the damping sometimes introduced when grid current flows.

In the anode circuit, besides the primary of the first filter coil, is a 1-microfarad by-pass condenser and a 5,000-ohm resistance. These parts are used to decouple the circuit from the oscillator, which is fed with the first detector through a 10,000-ohm resistance connected with the high tension. A current of 7 or 8 milliamperes flows through the 10,000-ohm resistance, the greater part going to the oscillator. The

*Specially Designed for "Wireless Magazine" by W. JAMES*

# THE 1932 A.C. SUPER 60—Continued



**A STATION YOU WILL HEAR WELL**  
A fine view of the Berlin Witzleben broadcasting station. This transmitter will be well received on the 1932 A.C. Super 60 almost anywhere in the British Isles

voltage applied to the first detector is therefore about 120 volts, and is held at about this value by the drop in the resistance.

Bias for the oscillator is obtained in the usual way through a 1,000-ohm resistance shunted by a 1-microfarad condenser. Strong oscillations are produced over both wavelength ranges and these are applied to the second grid of the first detector.

### New Signal Formed

We have, therefore, the incoming signals applied to the first grid and the local oscillations to the second grid, with the result that the anode current is varied according to the strength and frequencies of both. In the anode circuit we have a new signal having the frequency and wavelength of the intermediate-frequency amplifier. This is amplified by the following stages.

Much depends upon the proper working of the first detector or mixer valve, as it is frequently called. Rectification must occur and the strength of the local oscillations must be such that the maximum output is obtained.

**ALTERNATIVE MAINS TRANSFORMER**  
This A.C. mains transformer, the R.I. type EX30, is suitable for use in the 1932 A.C. Super 60

This first stage is followed by two stages using the new variable- $\mu$  or multi- $\mu$  screen-grid valves. These valves are very different from ordinary screen-grid types. They are so constructed that the slope varies over a wide range with the grid bias. Further, quite large signals may be dealt with.

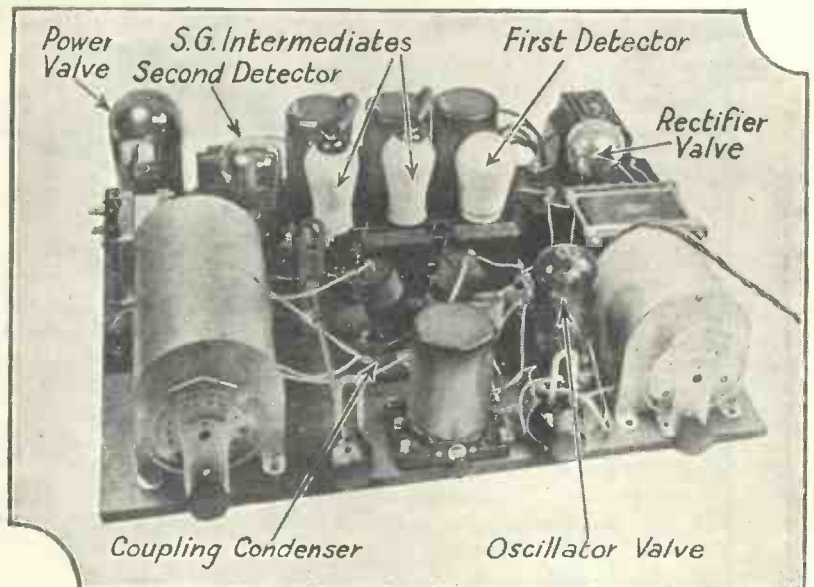
Thus, the valves are of considerable value in a set such as this, where the amplification must be adjustable over a wide range with the minimum of trouble.

Osram valves are used, and the resistances connected across the circuit have about the values suggested by the makers. First is a 10,000-ohm resistance. This is followed by a 7,500-ohm resistance, and then comes the potentiometer of 5,000 ohms. The screens of the two valves are connected to the junction of the 10,000- and 7,500-ohm resistances, and the cathodes are joined to the contact of the potentiometer.

### Increasing Bias

When the moving contact is at the bottom of the resistance in the diagram the cathodes are at the same potential as the grid circuits; in other words, the bias is zero. As the moving contact is shifted upwards towards the 7,500-ohm resistance, the bias increases: the voltage of the screens does not vary much.

The result is that the slope of the



### ISN'T IT SIMPLE?

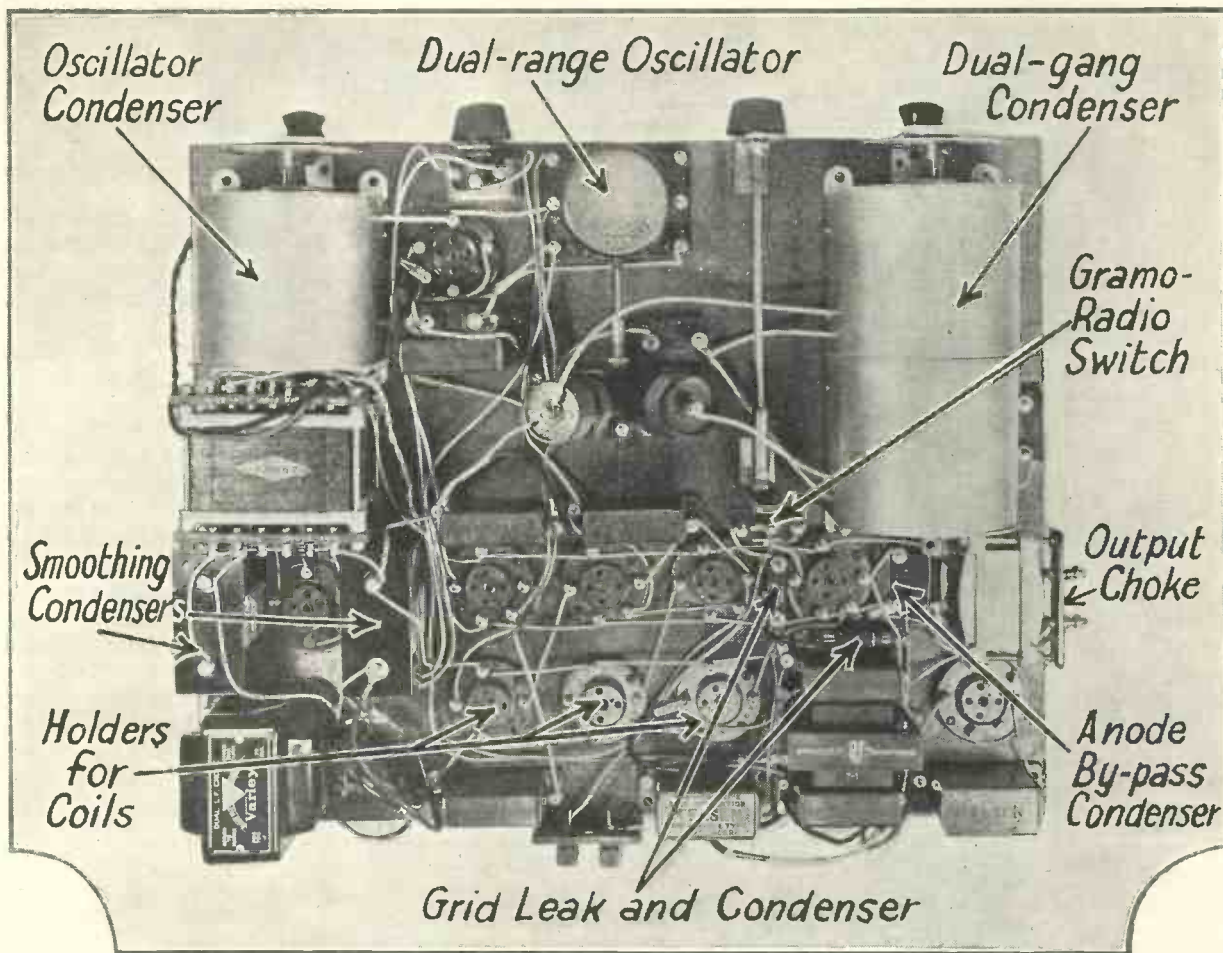
For a complete A.C. receiver the 1932 A.C. Super 60 is particularly simple, as this photograph shows



valves varies as the control is adjusted and the magnification changes with the setting of the potentiometer.

This is a very good volume control. The amplification can be varied from the maximum downwards to the point where the local station is heard at weak strength. The two multi- $\mu$  valves are of the metallised type, and so is the first detector. The metal coating of the bulbs, being connected to the cathodes, forms an effective screen and assists stability.

# USES TWO VARIABLE-MU VALVES



**SO SIMPLE THAT ANYONE CAN BUILD IT WITHOUT DIFFICULTY**

*This special plan view is conclusive proof that the construction of the 1932 A.C. Super 60 is within the capabilities of any amateur. Six valves are used and there is a rectifier valve for taking current from the mains*

An ordinary three-electrode valve is used as the second detector with a grid condenser and leak. There is a switch in the grid circuit. When it is in one position the grid condenser is connected to the grid. The grid leak is joined between the grid and cathode, and so stays in circuit.

### Pick-up Switching

A pick-up can be left connected to the terminals provided, because the switch disconnects it from the detector valve when receiving wireless. One side of the pick-up is joined to the bottom of the grid-bias resistance and the other side to the switch, with the result that the valve is biased when the pick-up is connected.

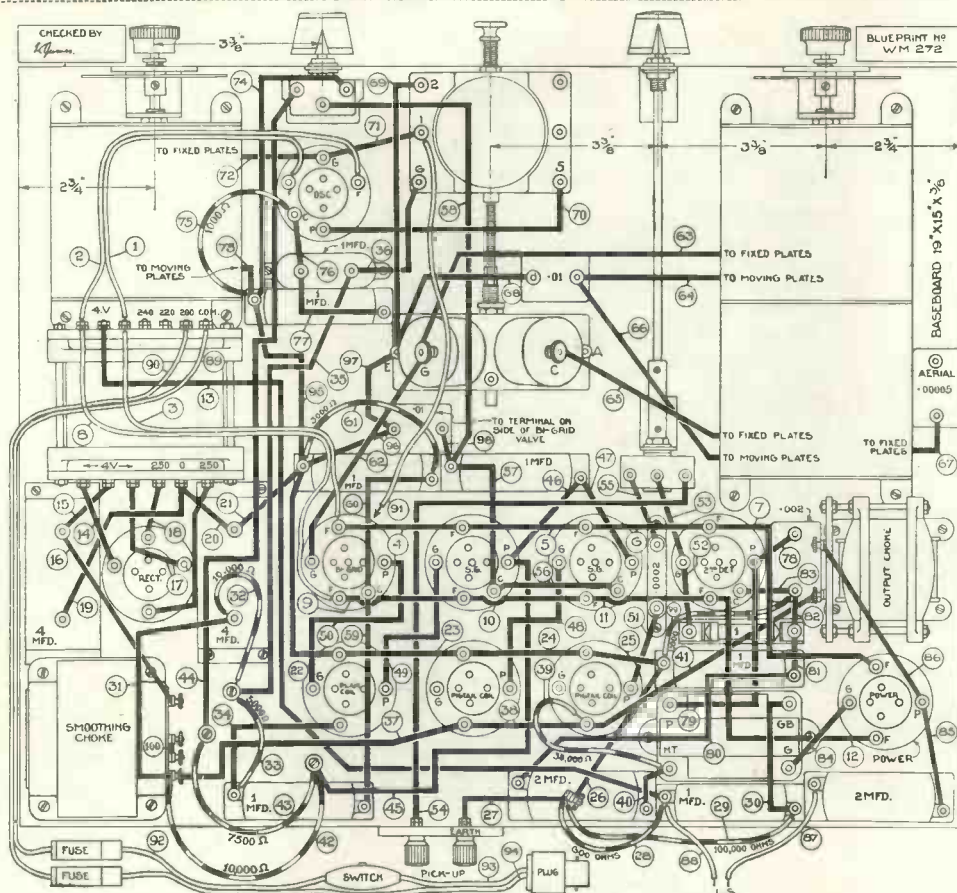
Leaving the grid leak in circuit is a good practice. For one thing, the grid circuit is never broken, and secondly, the chance of hum entering the grid circuit is much reduced.



**ANOTHER STATION TO LISTEN FOR**

*Soitens is a favourite station and you will get it without difficulty with the 1932 Super 60. This photograph shows Roland Piece, the director*

# THE 1932 A.C. SUPER 60—Continued



QUARTER-SCALE LAYOUT AND WIRING DIAGRAM

A full-size blueprint of the 1932 A.C. Super 60 can be obtained for half price, that is 9d., post free, if the coupon on the last page of this issue is used by February 29. Ask for 'No. WM271. Connect up the leads in the numerical order indicated

fairly moderate impedance the current is 4 or 5 milliamperes and this the transformer deals with quite easily.

### Power Stage

Finally, there is the power stage, having a directly-heated valve with a choke-condenser filter for the loud-speaker in the anode circuit. Grid bias is obtained from a resistance joined in the negative side and there is a 1-microfarad condenser and a 100,000-ohm resistance for decoupling the grid circuit of the transformer.

Everything is arranged upon the baseboard. On the left is the two-gang tuning condenser, and on the right the single condenser used to tune the oscillator. In the centre is the wave-length - range switch, common to the oscillator and the aerial-filter coils, and this has to the right the volume (Continued on page 90)

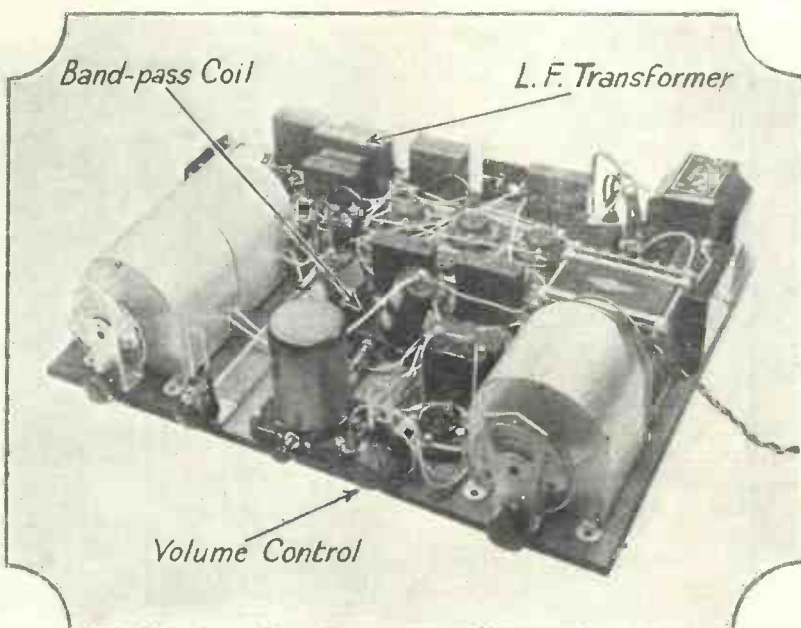
The grid condenser is of .0002 microfarad and the grid leak is of 1 megohm. These values are satisfactory for all purposes.

The higher notes would be strengthened a little by reducing the condenser to .0001 microfarad and the grid leak to .5 or .25 megohm, but I doubt whether the changes would be worth making in view of the good quality to be obtained from the set as described.

### Important Condenser

There is in the anode circuit of the detector a by-pass condenser of .002 microfarad as well as the usual de-coupling for the transformer. This condenser has important work to do. It carries the high-frequency currents from the anode to the cathode and improves the effectiveness of the circuit.

A high-ratio transformer is used to couple the detector and power valves. With a detector valve of



PANEL CONTROLS THAT ARE SIMPLE TO OPERATE

From left to right are (1) the band-pass tuning condenser, (2) gramo-radio switch, (3) wave-change switch, 4) volume control, and (5) oscillator tuning condenser



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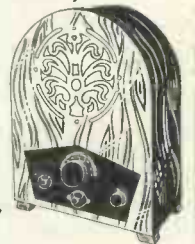
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### 1932 PLUG-IN COIL 3

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(as illustrated)

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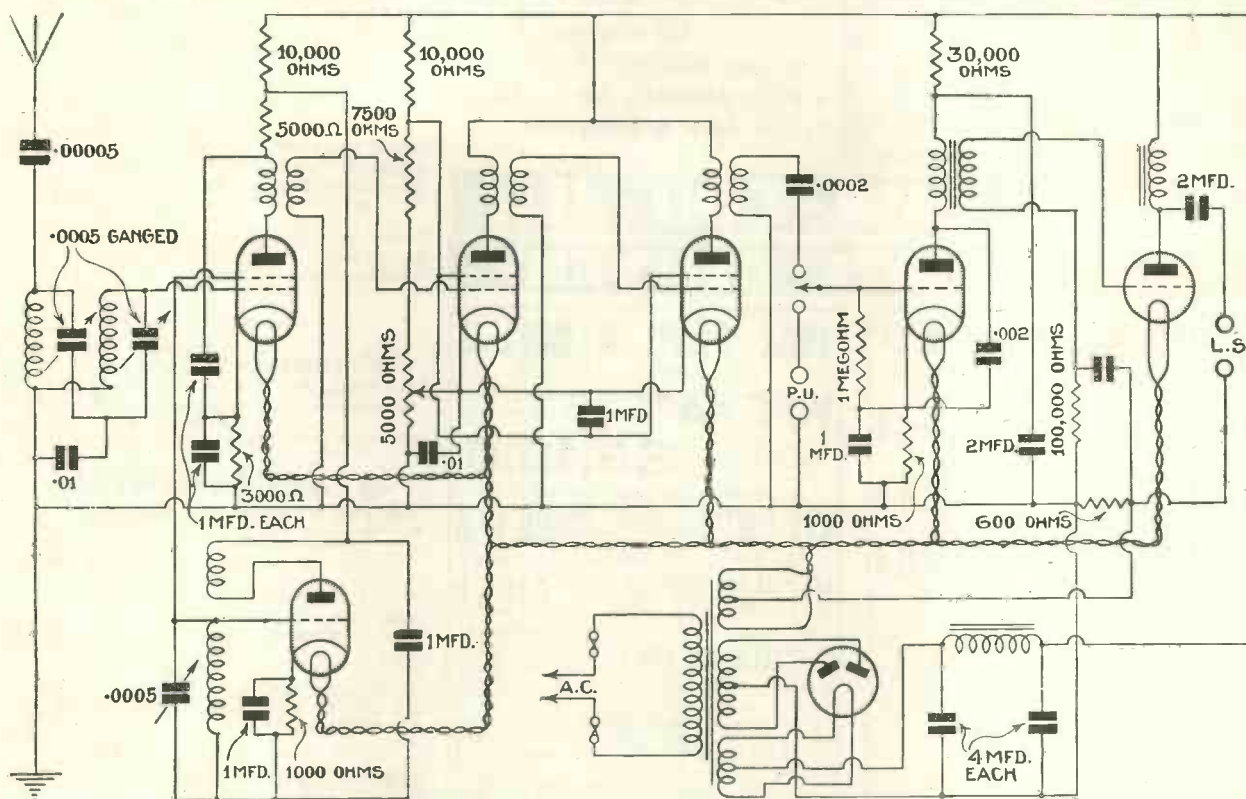
for which I enclose  
Cash/H.P. Deposit £ s. d.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

W.M. 2/1932

## THE 1932 A.C. SUPER 60—Cont. from page 88



POWERFUL CIRCUIT SIMILAR TO THE BATTERY MODEL 1932 SUPER 60

Two variable- $\mu$  valves are used in the intermediate-frequency stages. There is band-pass aerial tuning and a pick-up can be used at the turn of a single switch. A.C. mains current is rectified by means of a valve

control and to the left the radio-gramophone switch.

The parts specified should be used as there is not much room for more bulky parts. The tuning condensers can be fitted first, and then the oscillator and aerial-filter coils. Place the valve holders in line and see that the super-heterodyne coils fit nicely and without touching.

#### Five-pin Holder

Five-pin valve holders could be used throughout if desired, but it is just as well to remove the cathode socket and fixing of those holders where they are not used. Space the fixed condensers carefully, as indicated in the drawing, and avoid faulty contacts by tightening all bolts before the parts are screwed down.

It is better to connect the flexible resistances after the wiring has been finished. The wiring is, of course, not quite so easy as in the case of a battery set.

All important wires are short and the few long wires are in high-tension and grid-bias circuits where the results would not be improved by

making them shorter. Oiled-cotton sleeving and tinned-copper wire is used for the connections.

In several instances a long length of wire can be taken from point to point without a break. An example is in the heater circuit and the high-tension supply leads.

The greatest care must be taken when fitting the flexible resistances. These have fairly long metal ends and they must be so fastened that contact with another part cannot take place. Use small bolts and nuts for fitting a pair of resistances together and afterwards cover the joints with tape.

The wires from the tuning condensers come through holes in the covers and are insulated with sleeving. There is one wire which goes to the .00005-microfarad condenser and to the other side of this a length of flexible wire with a wander-plug is joined. This can be passed through the side of the cabinet and the aerial be connected through a socket which will take the plug.

A flexible wire is used to connect the grid circuit of the oscillator with the terminal fixed to the base of the

A.C. bi-grid valve. This wire will have to be fitted before the valve is plugged into its holder.

The positions of the various valves and coils are shown in the diagram and all should be fitted before the mains supply is connected. Then, when the A.C. is switched on there will be a suitable load for the rectifiers.

#### Ganging the Circuits

It is necessary to gang the tuned circuits joined to the aerial and the procedure has been described when dealing with the battery model of the 1932 Super 60. Tuning is sharp on both wavebands as with the battery model; in fact, the chief difference in the results is that the volume is greater with this set.

Quality is better, too, largely because the valves are of good size and there is ample high tension. A noticeable feature is the way in which the volume control does its work.

The volume of the local station is easily reduced to weak strength and the quality does not appear to vary with the setting of the volume control, excepting overloading of the

# A SUPER-HET GRAMO-RADIO SET

valves, which can occur if the control is not used properly.

There is a surprising number of stations to be received at full strength and the power valve will give ample output when fully loaded. There is not the slightest sign of hum in the output and the set is quite stable.

The multi-mu valves play a part in this as they have very useful working characteristics in comparison with ordinary screen-grid valves.

## Sharp Oscillator Tuning

It will be found that the tuning of the oscillator is sharper than that of the aerial filter and that stations are heard with the oscillator set at two frequencies. This is normal. Interference is greatly reduced by the band-pass aerial filter and it must be accurately set in order that the selectivity before the first valve shall be as high as possible.

An indoor aerial is satisfactory as the set is sensitive enough to bring up the strength of weak inputs to load up the power valve. At the same time, there is often a reduction in the ratio of mush and noise to signal strength when a high aerial is used.

A good earth is always an advantage as it helps stability and often reduces noises on bad mains. The background is particularly quiet, but in some districts a slight mains noise may be heard unless an earth is used.

## COMPONENTS NEEDED FOR THE 1932 A.C. SUPER 60

### CHOKES, LOW-FREQUENCY

- 1—Tunewell, type S20/25, 12s. 6d. (or Igranic, Bulgin.)
- 1—Varley dual, type EP11, £1 1s.

### COILS

- 1—Lewcos band-pass filter, type BPF, 12s.
- 1—Lewcos oscillator, type TOS, 8s. 6d.
- 2—Lewcos super-het intermediates with pig-tails, type IFTP, £1 1s. (or Wearite OT2, Igranic.)
- 1—Lewcos super-het intermediate without pigtail, type IFT, 10s. 6d. (or Wearite OT1, Igranic.)

### CONDENSERS, FIXED

- 1—T.C.C. .00005-microfarad, type 34, 4s. 6d.
- 1—T.C.C. .0002-microfarad, type 34, 1s. 6d. (or Dubilier, Telsen.)
- 1—T.C.C. .002-microfarad, type S, 1s. 6d. (or Dubilier, Telsen.)
- 2—T.C.C. .01-microfarad non-inductive, type S, 5s. (or Dubilier.)
- 7—Telsen 1-microfarad, 15s. 9d. (or Dubilier, T.C.C.)
- 2—Telsen 2-microfarad, 6s. (or Dubilier, T.C.C.)
- 2—Formo 4-microfarad, 400-volt working, 11s.

### CONDENSERS, VARIABLE

- 1—Ormond .0005-microfarad two-gang, type R/429/S2, with disc drive, 16s. 6d. (or Utility, Jackson.)
- 1—Ormond .0005-microfarad, type R/429/S1 with disc drive, 9s. 6d. (or Utility, Jackson.)

### FUSE

- 2—Belling-Lee flex fuses, 2s.

### HOLDER, GRID-LEAK

- 1—Readi-Rad, 6d. (or Bulgin, Telsen.)

### HOLDERS, VALVE

- 10—W.B. four-five pin, 8s. 4d. (or Benjamin, Wearite.)

### TERMINALS

- 2—Belling-Lee terminals, marked: Pick-up (2), 1s. (or Clix, Ealex.)

### RESISTANCES, FIXED

- 1—Bulgin 600-ohm super flexible, 1s. 3d.
- 2—Magnum 1,000-ohm flexible, 1s. 6d. (or Bulgin, Lewcos.)
- 1—Magnum 3,000-ohm flexible, 1s. (or Bulgin, Lewcos.)
- 1—Magnum 5,000-ohm flexible, 1s. (or Bulgin, Lewcos.)
- 1—Magnum 7,500-ohm flexible, 1s. (or Bulgin, Lewcos.)

- 2—Magnum 10,000-ohm flexible, 2s. (or Bulgin, Lewcos.)

- 1—Magnum 30,000-ohm flexible, 1s. 6d. (or Bulgin, Lewcos.)

- 1—Magnum 100,000-ohm flexible, 1s. 6d. (or Bulgin, Lewcos.)

- 1—Telsen 1-megohm grid leak, 9d. (or Dubilier, Watmel.)

### RESISTANCE, VARIABLE

- 1—Wearite 5,000-ohm potentiometer, with bracket, 4s.

### SUNDRIES

Tinned-copper wire and oiled-cotton sleeving (or Jifilink).

- 1—Belling-Lee terminal block, 8d.

Length of twin flex for mains leads.

### SWITCHES

- 1—Wearite single-pole change-over, type I21 with terminals, bracket, and 6½-in extension rod, 4s.

- 1—Bulgin flex switch, type 18, 2s.

### TRANSFORMER, LOW-FREQUENCY

- 1—R.I. general purpose, ratio 1 to 7, 10s. 6d.

### TRANSFORMER, MAINS

- 1—Parmeko, type WMA/2, £2 5s. (or R.I. type EY30).

### ACCESSORIES

#### CABINET

- 1—Camco Waverley radio-gram, junior model in oak, £5 10s.

#### GRAMOPHONE MOTOR AND PICK-UP

- 1—Macom electric motor with pick-up, model D, £4 12s. 6d.

#### LOUD-SPEAKER

- 1—W.B. permanent magnet, type PM1 chassis, £5 5s. (or Amplion, Blue Spot).

#### VALVES

##### OSCILLATOR

- 1—Osram MHL4, 15s. (or Mazda AC/HL, Marconi MHL4).

##### FIRST DETECTOR

- 1—Cossor 41MDG, £1 2s. 6d.

##### S.G. INTERMEDIATES

- 2—Osram VMS4, £2 5s. (or Mullard MM4V, Marconi VMS4).

##### SECOND DETECTOR

- 1—Osram MH4, 15s. (or Mazda AC/HL2, Marconi MH4).

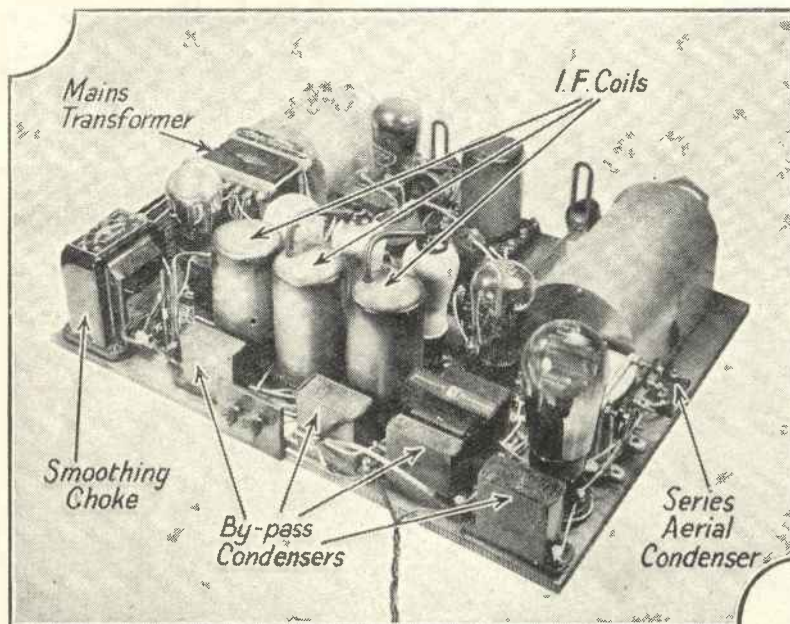
##### POWER

- 1—Osram PX4, £1.

##### RECTIFIER

- 1—Osram U10, 15s. (or Marconi U10).

The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower



WELL DESIGNED—AND IT WORKS WELL, TOO!

This view of the 1932 A.C. Super 60 shows the assembly completed and with all the valves in position ready for use

It is necessary to gang the input circuit with care and as any inaccuracy is likely to throw out the tuning at the lower end of the range rather than at the upper end, the tuning condenser should be set with the receiver tuned to a low wavelength.

The trimmer on the aerial side of the two-gang condenser should, therefore, be adjusted with the set tuned to a station working on a low wavelength. If a fairly weak station is chosen the tuning will be sharp enough for the circuits to be accurately set.

### Matched Coils

The ganging should hold good over both ranges and the coils are matched in order that the tuning shall hold over the whole of the tuning ranges when once the trimmer has been set.

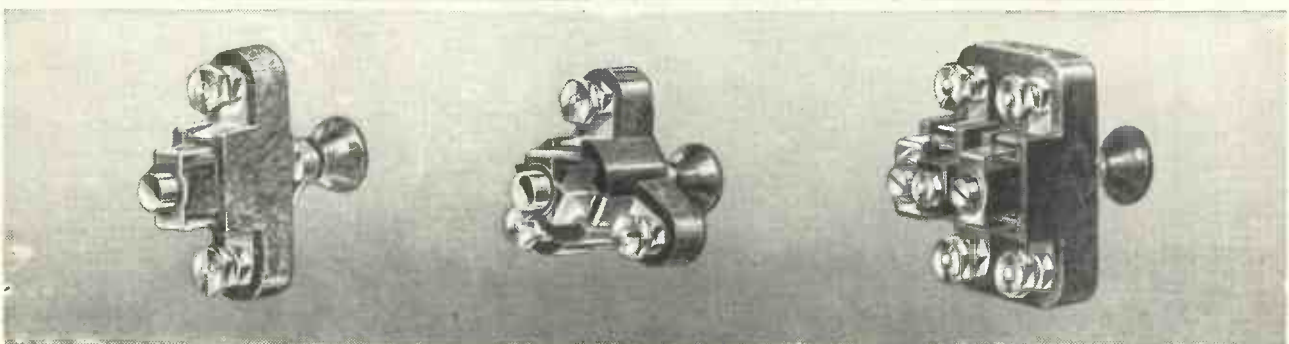
Valves of the metallised class are to be preferred to those having plain bulbs.

# TELSEN

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RADIO RECEPTION



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CLEARER . . .  
MORE LIVELY  
THAN BEFORE

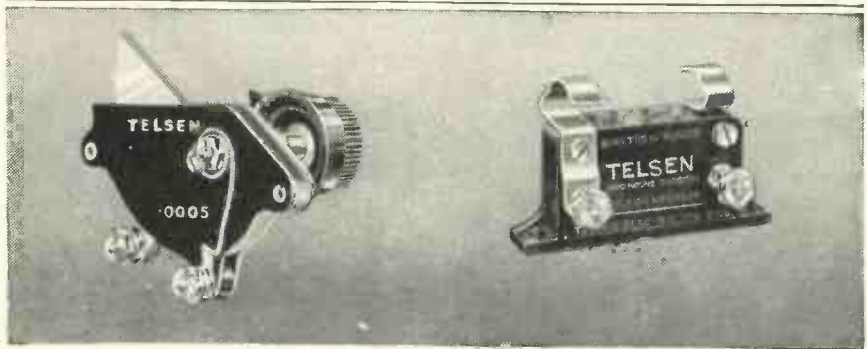
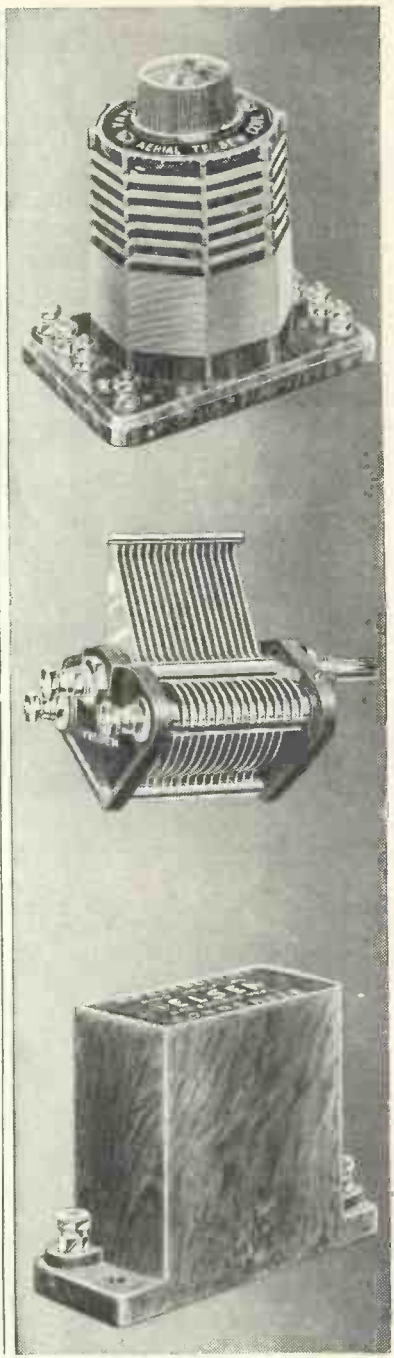


"CHANGING over to Telsen is like taking the wool out of your ears"—that is the verdict of an enthusiastic Telsen constructor which inspired the illustration on the opposite page. Telsen Components in your set give you a realism which is astonishing—they enable you to sit back and hear, without straining forward to listen—they bring every item on the programme "nearer, clearer, more lively than before."

- DUAL-RANGE AERIAL COIL .. .. 7/6
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in capacities .0005, .00035, .00025 .. 4/6
- BAKELITE DIELECTRIC DIFFERENTIAL,  
REACTION AND TUNING CONDENSERS  
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- Two-point .. .. Price 1/-
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- Four-point (2 pole) .. .. Price 1/6

# TELSEN

100% BRITISH  
RADIO COMPONENTS



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# The B.B.C. Resignations

IS THEIR IMPORTANCE OVER-RATED?



THE B.B.C.'s TASTE IN DECORATION

One of the sculptural decorations on the outside of Broadcasting House. The panel represents "Ariel Listening to Celestial Music" interpreted by Mr. Eric Gill

SOMETHING'S wrong with the B.B.C. Look at the number of resignations—Arthur Burrows, R. E. Jeffrey, Rex Palmer, Captain A. G. D. West, Captain Eckersley, Miss Hilda Matheson, and a few other lesser lights.

Surely none of these would have surrendered their jobs unless some hidden intrigue was in progress. What's wrong at Savoy Hill? The maiden aunt must be in the saddle and the protagonists of "pep" thrown to the lions. Gloom, unutterable gloom, without all hope of day.

## Tragedy or Comedy

The above sounds almost like a tragedy, but to Savoy Hill it is rather a comedy, for it represents the latest phase in the Pecksniffian diatribe against the directors of broadcasting, whose every action is suspect and subject to the merciless light of zealous but unscrupulous publicity.

The mere fact that a half-dozen or so resignations from a staff of over eight hundred persons—resignations spread over a period of five or six years—have been all dragged up and recounted recently as a kind of catalogue of the B.B.C.'s crimes

against the listener is surely sufficient to show to sensible minds how prone the critics are to strain after a camel and swallow a gnat.

Is it to be wondered at that the B.B.C. ignores its critics when so much printer's ink is wasted on such criticism?

Possessing the advantage of being able to write from the standpoint of an authoritative observer, I can state quite definitely that no resignation that has yet taken place reflects any discredit on the B.B.C., either in relation to its public policy or the treatment of its staff.

Indeed its treatment of two or three who have left in the hope of being able to "better themselves" has been extremely generous, suggesting that in the event of the Corporation being at any time obliged to dispense with the services of any member of the staff through no fault of the individual's own, he would find himself financially in a position to take things easy for a very long time to come, thanks to the form and manner of the Godspeed given to him by his erstwhile employers.

One peculiar effect of service with the B.B.C. should not pass un-

In this article Our Special Commissioner, who has special sources of information about what goes on behind the scenes at the B.B.C., discusses some of the recent staff resignations and suggests that they are not of such great importance as has been stated in some quarters

noticed; it is that work for broadcasting seems to be regarded as conferring upon the staff some degree of canonisation; and outside Savoy Hill they are held to belong to some higher sphere. How, otherwise, can one explain the vast amount of attention given to their doings, and more particularly to such things as resignations?

## Like Other Staffs

As a fact, the B.B.C. staff is very little different from the very ordinary members of staffs who adorn—or disfigure—business organisations, newspaper offices and the like.

You will find at Savoy Hill, as you will find elsewhere, those who are self-sacrificing in their loyalty and devotion to their work; and you will find some who, if a dispassionate and an analytical examination of their actual production were made by judges uninfluenced by any thoughts of favouritism, appear to be doing precious little for the benefit of broadcasting and are comparatively well paid for doing that little.

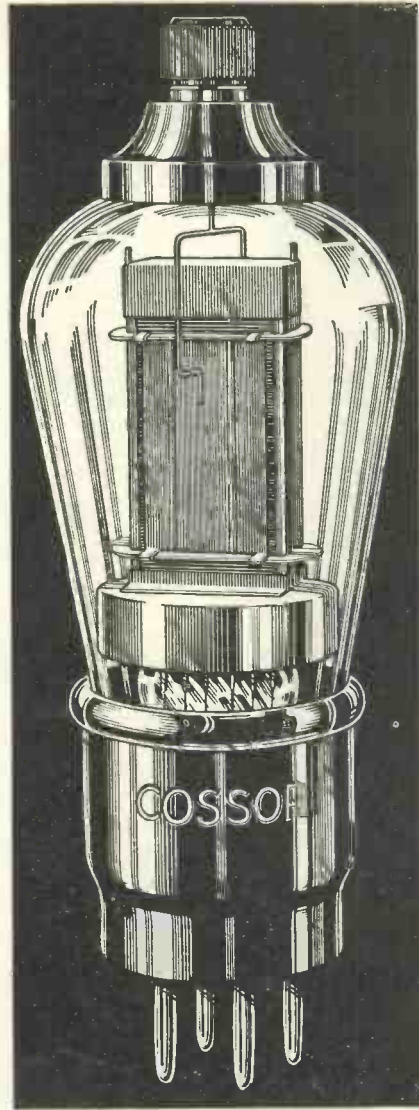
Still, inequalities exist in the best regulated houses, so conditions at Savoy Hill are not to be considered unusual.

## Over-rated

What it amounts to is that the private comings and goings of the B.B.C. staff are much over-rated. One might go further and declare that (alleged) changes in programmes and policy at Savoy Hill are over-rated. The work of programme building is 99 per cent. routine; so much is this the case that the deliberations of a programme board are no

(Continued on page 96)

# Used by the Designer of the 1932 "SUPER 60"



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use these types of  
COSSOR Valves  
and ensure maximum  
performance:—

- Oscillator : COSSOR 210 L.F.
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Don't take chances on the performance of your 1932 "Super 60." Make sure of the same range, the same tone and selectivity as the Designer obtained in his extended tests of this fine Receiver—use **Cossor Valves** throughout.

Because of their famous "Mica Bridge Mounting" **Cossor Valves** are absolutely true to characteristics. "Mica Bridge Mounting" ensures maximum efficiency and lifelong consistency of performance. Use **Cossor** and be *sure*.

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W.M. FEB.

# THE B.B.C. RESIGNATIONS—Continued from page 94



**SHE MAKES YOU LAUGH!**  
*Mamie Souther is a comedienne who broadcast recently*

longer necessary and such a board has long since ceased to function.

Nowadays, one official arms himself with a plain sheet of notepaper and a pencil, and proceeds to plan in the rough an outline of a day's programmes.

All that he requires to bear in mind is the format of previous programmes, to preserve the balance as between military band and orchestral performances, between contralto singers, sopranos, tenors and basses, and between this instrument and that.

Here an hour has to be allowed for a vaudeville programme, there for a radio drama.

An unavoidable outside broadcast—sometimes, but not always, having real programme value—will take up a proportion of the timing? Very well, cut down the musical programme for that night, or omit a talk.

### Filling in Blanks

Certain items must be as regular as to-morrow's dawn; then down they will go first; the blanks in between can be filled up afterwards in a way that will maintain the illusion of variety and alternativeness.

The work is done quite skilfully; it is, indeed, surprising that so few clashes occur as between the programmes transmitted on one wavelength and those on the alternative wavelength.

It is also a tribute to the programme architects that the duplica-

tion of songs and the light and shorter orchestral pieces is not more frequent, although it has happened on rare occasions that two artists, one booked for the National programme and the other for the Regional programme on the same evening, have themselves submitted lists of songs which they wish to broadcast and both lists have been given the O.K. by Savoy Hill, the fact that both lists contain one and the same song being by accident overlooked.

If small misunderstandings like the above occur within the B.B.C. offices, small wonder, perhaps, that the listener is at times bewildered by what appear to be vagaries, redundancies and the like in the published programmes.

Only recently the B.B.C. realised that the term "B.B.C. Light Orchestra" was likely to cause widespread misunderstanding among listeners who concluded, perhaps not unnaturally, that when such a combination was shown in the National programme as well as in the Regional on the same evening, the B.B.C. was "ringing the changes" in some unexplained manner and that one and the same orchestra was performing first on one wavelength and then on the other; whereas two separate and distinct combinations were playing in different studios.

For that reason, and to prevent any misunderstanding over the split-

ting up of the B.B.C. Symphony Orchestra of 117 players into smaller groups, the Corporation decided to retain the title of B.B.C. Symphony Orchestra for its big combination and to label the offshoots from it sections B, C, D and E.

The second and the fourth named are in reality light orchestras, section C consisting of thirty-six players and section E of forty-seven players, while B and D are small symphony orchestras, about whose work and nomenclature less misunderstanding is likely to occur.

### Talks Arrangements

Take another phase of this proneness to misunderstanding, namely, respecting the revision of the talks arrangements. The statement was published widely that the B.B.C. intended to change its policy completely, the suggestion being that the Corporation had become afraid of the consequences of allowing any individual broadcaster to go to the microphone and ventilate his opinions about plays, films, books, etc.

Actually, no change in policy was intended, the alterations being essentially of method only. The policy has always remained the same.

But the need for experiment ordained that a fresh line of country should be explored to see if broadcasting can yet give its public something that may provide a new angle for serious thought.

The theatre and film talks now deal with those subjects more generally, that is, productions are utilised as opportunities for the speaker to indicate tendencies and apparent policies rather than as subjects for criticism.

### Better Films and Plays

It is held that the fight for better films and plays can still go on, without recourse being necessary to the analysis of a particular production in order to point a moral. The speakers will, of course, find it essential sometimes to mention a particular film or play; but no attempt to cover every release or first night will be made.

The above is the sum and substance of the changes which have been made. Reduced to cold print, it looks so simple that one is inclined to wonder why so much fuss and bother should have been made over alleged changes in policy.



**YOU HAVE HEARD HIM, TOO**  
*The conductor of the Commodore (Hammer-smith) Cinema Orchestra—Joseph Muscant*





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One T.C.C. .00005 mfd type 34  
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 One T.C.C. .0002 mfd type 34  
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 One T.C.C. .05 mfd non-inductive  
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### \* The "1932 SUPER 60"

One T.C.C. .00005 mfd type 34  
 One T.C.C. .01 mfd non-inductive

### \* The "1932 A.C. SUPER 60"

One T.C.C. .00005 mfd type 34  
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 One T.C.C. .002 mfd type 5  
 Two T.C.C. .0J mfd non-inductive

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These three "Star" receivers—real "star" performers—demand star components—Nothing but the best throughout—that is why the designers use T.C.C.—the condensers with the unique experience of 25 years condenser making behind them. Follow the lead of the designers—don't risk other than "star" results—use T.C.C. . . . . .

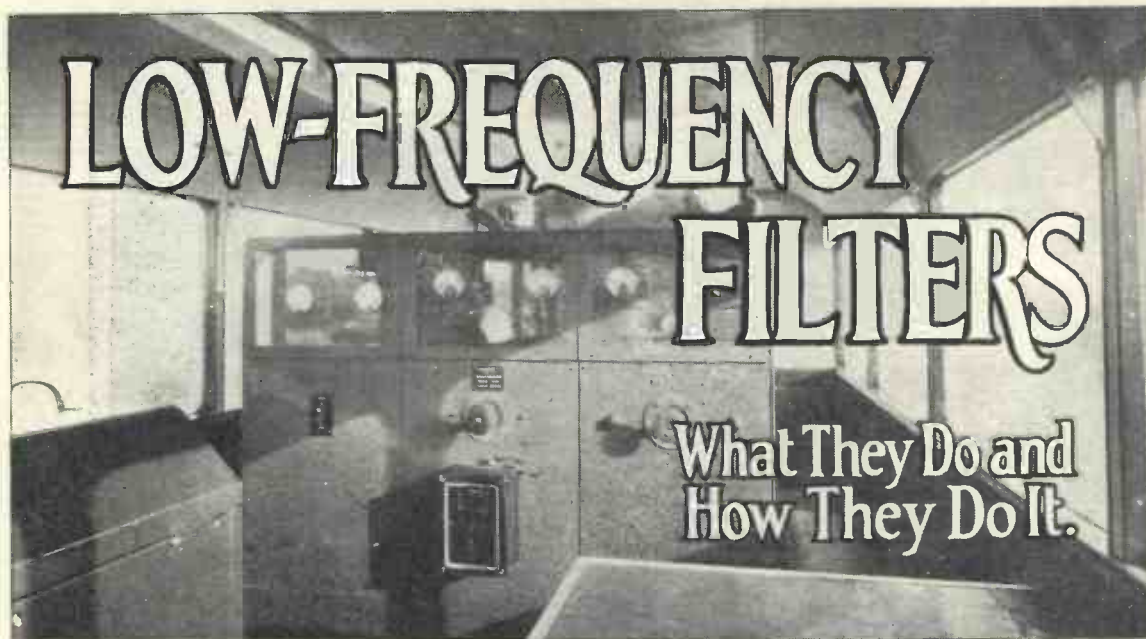
Remember whatever the set insist on "the condenser in the green case."

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# LOW-FREQUENCY FILTERS

## What They Do and How They Do It.

AN OUTFIT FOR GREAT POWER AND PURITY

Inside of the Marconiphone amplifier coach showing the main amplifier and searchlight type of loud-speaker which can be raised above the roof. This van is used for public-address work all over the country

MANY users of gramophone pick-ups are quite satisfied with them as they stand. Others, who work with super amplifiers, feel that they would like to be able to cut off the upper frequencies after a certain point, in order to eliminate surface noise, but their experiments so far may not have been over-successful in the matter of producing a really sharp cut-off.

The reader who is not interested

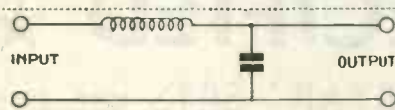


Fig. 1.—Simple inductance-capacity filter

in scratch filters may, however, be just as much concerned with cutting off some of the upper frequencies in his ordinary reproduction.

### Jumble of Stations

What with the jumble of stations working at the present time and with the great high-frequency amplification embodied in many modern receivers one is apt to find reproduction almost completely spoilt by mush, heterodyne whistles and such like, even on stations which would otherwise be of good programme value.

Both cases are amenable to treatment with a properly constituted low-pass filter. Such an arrange-

ment, as the name implies, is one which passes all frequencies below a certain value, and cuts off frequencies above this critical point.

In the ideal case the cut-off is sharp so that frequencies below the critical point are not affected at all, while no transmission takes place whatever above the chosen value.

Needless to say the ideal case is not obtainable in practice, but we can approximate to it to a degree limited principally by considerations of cost.

The study of filters is a very mathematical one, and all I propose to do in the present article is to give a simple explanation of the action of a filter, and then to give the facts concerning its operation without embarking on any proof.

In fact, some of the statements, from a purely technical point of view, may be slightly inaccurate, but I feel that this is tolerable if it results in a simple idea of what is happening.

We all know that if a condenser is

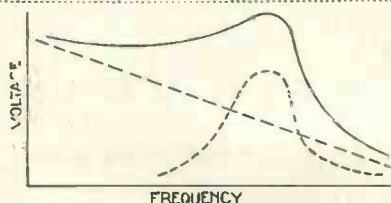


Fig. 2.—Effect on frequency response of inductance and condenser

Not enough is known by home-constructors about the possibilities of low-frequency filter circuits. In this article J. H. REYNER, B.Sc., A.M.I.E.E., explains how simple filters operate and how the values can be calculated. Such filters can be used in all kinds of low-frequency circuits

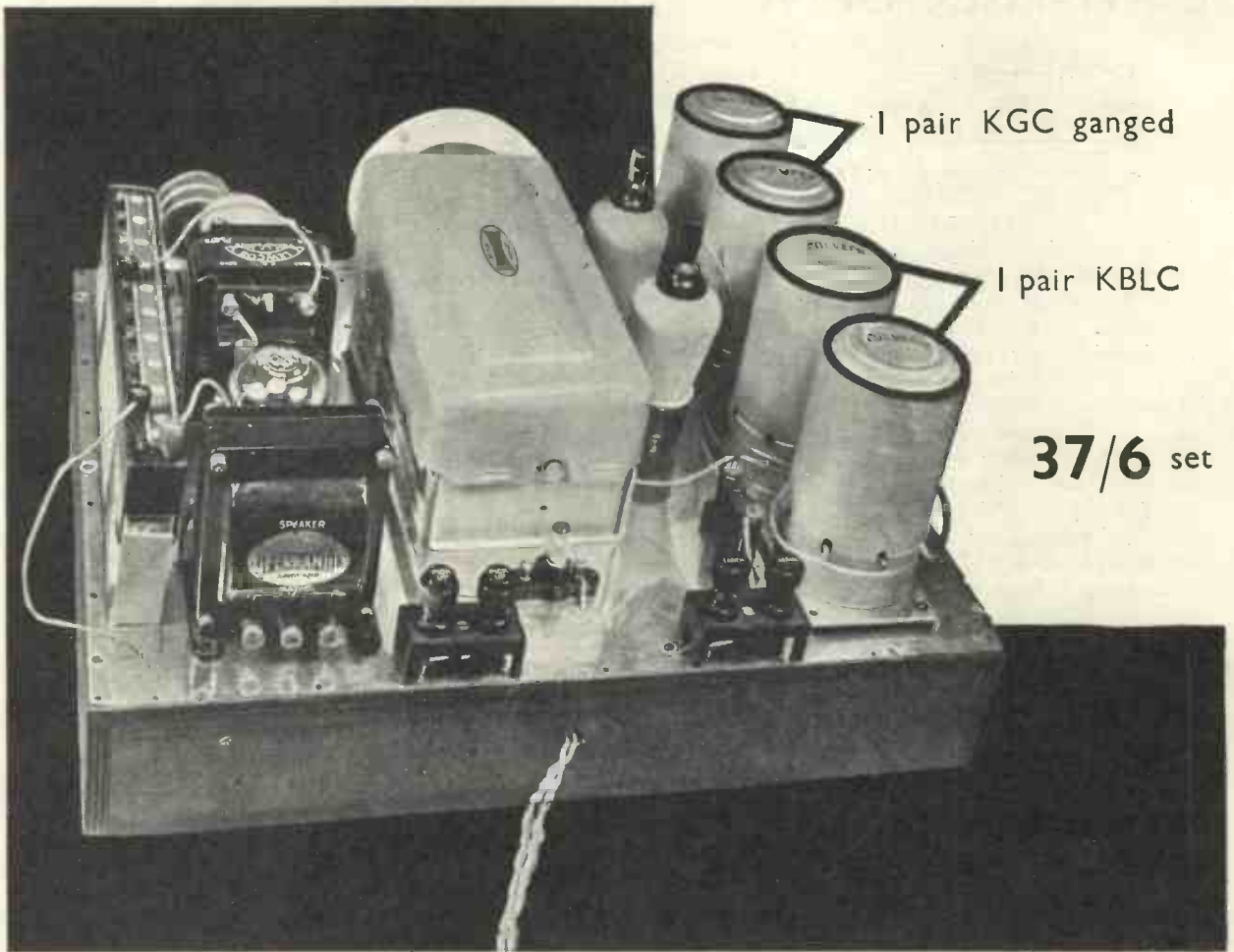
connected across a circuit it will tend to by-pass the higher frequencies, because the impedance of a condenser becomes less as we increase the frequency. Such an arrangement, however, begins to operate at quite low frequencies, and by-passes the current to an increasing extent as we increase the pitch of the note. Therefore, it does not in any sense conform to our ideal requirements.

### Improving Results

An improvement is obtainable by arranging a circuit of the form shown in Fig. 1, which consists of an inductance in series with the line, and a condenser across it. The input is applied at the left-hand side of the diagram, and the output is taken off across the condenser at the right-hand side of the diagram.

This inductance and condenser will resonate or tune at some particular frequency, and when they do a curious effect occurs which is

(Continued on page 100)



## THE DESIGNERS OF THE QUADRADYNE TAKE ADVANTAGE OF COLVERN EFFICIENCY

Once again Colvern Coils have been specified by the designers of a new receiver. The confidence shown in all Colvern components by leading technicians is a sure indication of their efficiency. Be sure that you use Colvern Coils as specified when building your "Quadradyne."

# COLVERN

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# LOW-FREQUENCY FILTERS—Cont. from page 98

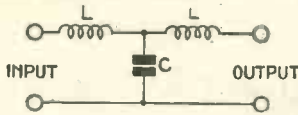


Fig. 3.—Making filter symmetrical by adding second inductance

well worth examining rather closely.

If we tune the condenser and the inductance to the frequency of the signal, the current which flows round the circuit increases considerably and therefore our voltage output, which is simply the voltage across the condenser, also tends to increase.

Fig. 2 illustrates the resulting effect. The shunting action of the condenser, indicated by the continuously falling line, is delayed by the choke, and subsequently due to the resonance just discussed we get a rise in the output voltage.

### Both Effects

Afterwards we have both effects acting in the same direction and tending to produce a decrease in the voltage, so that we are left with a sharp cut-off. This arrangement, therefore, is very similar to what we require. Below the cut-off point, the output is practically the same as the input, whereas beyond this point the output is only quite a small fraction of the input.

Now a simple filter of this sort will work and is quite easy to construct from existing components. The values of condenser and inductance will be given later in this article, but before proceeding to discuss this we must pass on to another consideration, that of matching the filter to the circuit with which it is used.

We have already considered the filter as transmitting the voltage from the input to the output end. We connect across the output some suitable impedance, which may either be a valve or a loud-speaker. In any case we have a voltage developed across the output end of the filter. Now what is to prevent this output voltage from forcing the current back through the filter in the opposite direction?

### Reflection

In actual practice it does tend to do so, the process being known as reflection.

If the circuit of Fig. 1 is examined it will be seen that, viewed from the output end, it is not the same as from the input end. In fact, it is not a

symmetrical arrangement, and if we are to avoid this loss of efficiency by reflection the first consideration is to make the filter symmetrical, which we do by adding another inductance as shown in Fig. 3.

This, then, becomes a single section of a T filter, and for proper operation we should always have a symmetrical arrangement of this type. There are other ways of arriving at the same symmetry which will be discussed shortly.

We must next arrange that the effective impedance of the filter is the same as the impedance at the input or output end. This, I fear, sounds extremely complex, but it is not really so.

The combination of inductance and capacity in the filter has some effective impedance, and we must arrange matters so that this is the same as the pick-up or loud-speaker which we are connecting across the filter.

This consideration is very often lost sight of in practice, and unless it is attended to the filter is not so successful as it should be.

The values of inductance and capacity required to fulfil these various requirements are obtained from the following simple formula—

$$L = 225,000 Z/f \text{ microhenries, where } Z \text{ is the output impedance in}$$

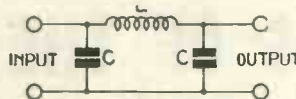


Fig. 4.—An H filter with condensers on each side of an inductance

ohms and  $f$  is the cut-off frequency in cycles per second.

Having found the inductance from this expression, the capacity is obtained from—

$$C = L/Z^2 \text{ microfarads.}$$

The resistance of the inductances should be kept low in order to obtain a sharp cut-off, a resistance of 100 ohms per henry being fairly satisfactory although reasonable filters can be made with higher values than this. If an iron core is used it should be of the constant-inductance type to avoid variation in the constants

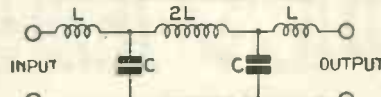


Fig. 5.—Two T-section filters in series

at different signal strengths.

There is another type of filter which is similar in action to that already discussed, but is arranged slightly differently. The Fig. 3 filter is shown as a T arrangement having two inductances on each side of a condenser. The arrangement shown in Fig. 4 is an H filter having two condensers on either side of an inductance. This arrangement works equally well, and is sometimes more convenient. The same formula applies.

Any number of sections of the

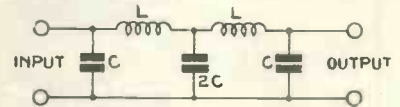


Fig. 6.—Two H-section filters in series

type described may be connected in series. Fig. 5, for example, shows two T sections in series, and Fig. 6 shows two H sections in series.

It will be noticed in each case that the value of the middle impedance (either inductance or capacity as the case may be) is twice the ordinary value, because there are effectively two such impedances together.

The more sections one uses in a filter the more nearly does it conform to the ideal requirements of an absolute cut-off at one point, with no attenuation up to that point and infinite attenuation afterwards, always provided that the filter is matched to the input and output impedances.

We will now work out a few practical examples to show how the formulae are applied.

### Scratch Filter

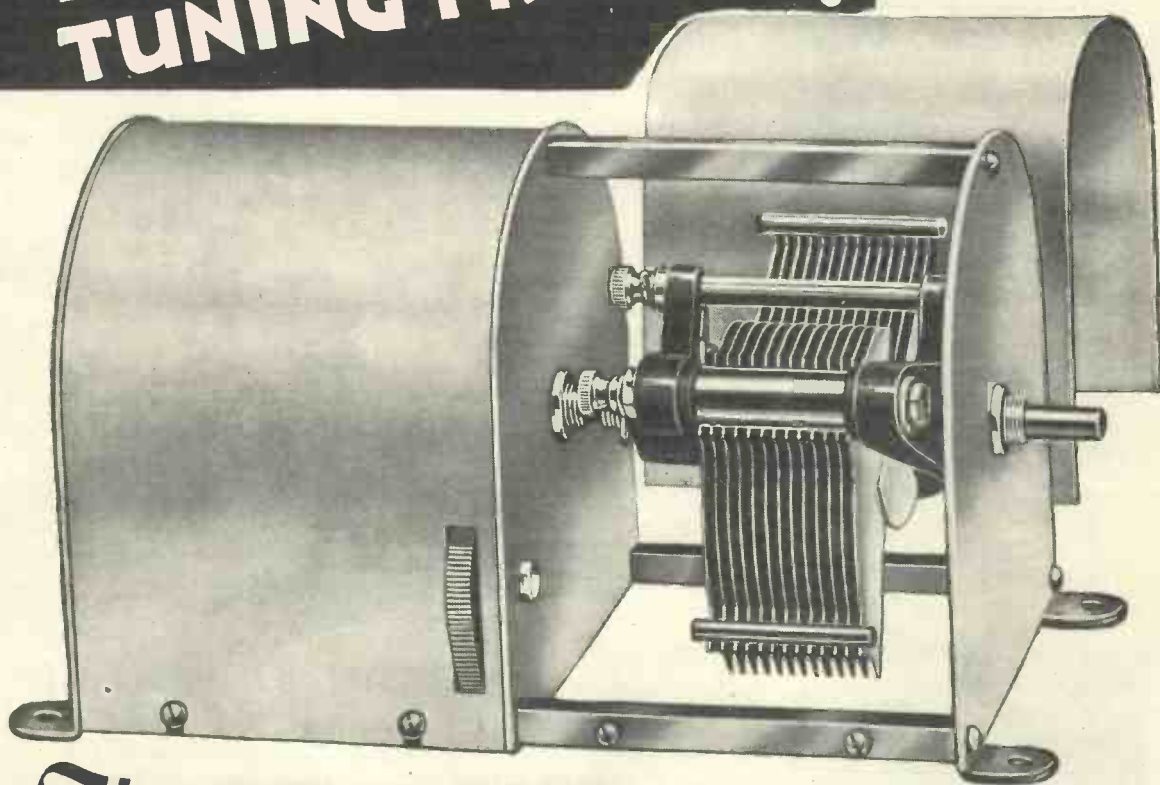
Let us consider first of all a scratch filter connected across a pick-up. First of all on the input side we have the pick-up, which has a certain impedance. It happens to be a varying impedance, and therefore, we cannot match the filter accurately, but we can choose a value which is a reasonable compromise.

I hope to give more definite information on this point in the future article, but a value of 20,000 ohms may be taken as a suitable figure for many pick-ups.

At the other end of the filter we have a valve which presents an impedance which is very high, certainly nothing at all comparable with the pick-up. Strictly speaking, therefore,

(Continued on page 102)

**ORMOND SOLVES MODERN TUNING PROBLEMS!**



## The ORMOND Screened Gang Condensers

|   |             |
|---|-------------|
| Cat. No. R/429/S1<br>Single Screened<br>No. 4 Condenser. .0005  | <b>7/-</b>  |
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| The Disc Drive for use with<br>the above each   | <b>2/6</b>  |

Specified for the "1932 Super 60 Receivers" described in this issue.

THIS model is constructed with No. 4 Log Hollow Spindle condensers.

It is comprised of a rigid framework, the condensers being mounted between screening plates.

The screening covers are detachable, enabling easy connection of leads. Trimmers, controlled by small Thumb wheels at side, are provided for adjustment, to compensate for stray capacities which may affect the accuracy of tuning ganged circuits.

Feet are fitted for securing the condenser to the baseboard. Dial spindle may be adjusted to a required position, to allow of attachment of control dial either in front or rear of panel.

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Telephone: Clerkenwell 5334-5-6 and 9344-5-6. Telegrams: "Ormondengi, Isting."



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Speedy replies result from mentioning "Wireless Magazine"

# LOW-FREQUENCY FILTERS—Cont. from page 100

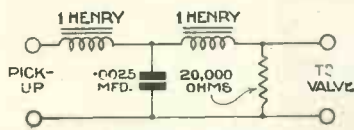


Fig. 7.—Scratch-filter circuit for connecting across pick-up

we should have a step-up transformer between the filter and the valve. A more convenient method, which involves a slight reduction in signal strength, is to connect a resistance across the output of the filter and to connect the valve across this resistance. The value of the resistance, of course, is made to match the filter and the pick-up.

Assuming a cut-off at 4,500 cycles and a 20,000-ohm pick-up, we have

$$L = 225,000 \times \frac{20,000}{4,500} \mu H$$

$$= 1,000,000 \mu H$$

$$= 1 \text{ Henry}$$

$$C = \frac{1,000,000}{(20,000)^2} = .0025 \mu F$$

Our circuit would thus be as in Fig. 7.

If desired the 20,000-ohm output resistance can be a potentiometer, the valve being tapped down to reduce volume.

The two inductances must be quite separate.

Let us next consider the question of a loud-speaker filter. This is an arrangement which is connected between the set and the loud-speaker. We may use a similar arrangement, the only difference in this case being that the impedances are usually much lower. The effective impedance of a loud-speaker is only a few thousand ohms and, therefore, our constants have to be altered.

The most satisfactory solution is to use an output transformer in the anode circuit of the last valve. This output transformer would be matched to the loud-speaker in the normal course of events, so that the input

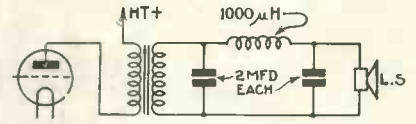


Fig. 8.—An H filter arrangement for connecting to a loud-speaker

and output impedances are similar to start off with. It only remains to find out what the impedances are and to design the filter to suit this value.

Take a low resistance loud-speaker having an impedance of 25 ohms and a cut-off at 5,000 cycles :

$$L = 225,000 \times \frac{25}{5,000}$$

$$= 1,125 \mu H$$

$$C = \frac{1,125}{(25)^2} = 1.8 \mu F$$

Fig. 8 shows an H filter arranged on this basis, but the values have been rounded off to the nearest convenient figure.



ON A BRITISH LONG-DISTANCE TRAIN  
Listening-in with headphones on an L.N.E.R. long-distance train. A small charge is made for this luxury

**T**RAVELLERS on a certain railway are now entitled to take their portable radios or gramophones with them free of charge. Already this has caused annoyance.

Passengers who wish to travel in

in wonderfully," will doubtless think that his fellow travellers will be as interested in his achievement as he is himself.

How then can this difficulty be solved? The new freedom could be

## Radio on Trains

silence are not likely to welcome the arrival in their compartment of a wireless or gramophone fan who immediately proceeds to give them the full benefit (or otherwise) of his instrument. Where earphones are used the disturbance will not exist, I admit, but the gramophone is incapable of individual entertainment. It must blare forth its sounds to all. Also, inevitably, there will be the wireless "twiddler" who is ever roaming the ether to see what he can get and who, on finding that Budapest is "coming

restricted to the owners of radios only, thus eliminating the too verbose gramophone, but the wireless loud-speakers still remain. A further restriction enforcing the use of headphones might be made.

### Solution to the Problem

Special compartments might be devoted to radio listeners, in the same way that certain compartments are sacred to smokers. But if this is done there will be precious little of the train left for non-smokers and non-etherites!

No; if our generous railway company wishes to let its passengers have entertainment, let it supply the entertainment itself. This has already been done on a London-Leeds express.

During a recent journey on this train I sampled the radio reception. Daventry 5XX was the station offered (I was told that the North Regional transmission is alternatively tuned in at certain times). The quality and volume were both highly satisfactory, and listening-in as the fields whirled past the windows certainly banished the tedium of the long journey. **SPARKS.**

RADIO TIMES

40

THURSDAY

DAVENTRY  
193 kc/s (1,554.4 m.)

PROGRAMME

The "W.M." says "Use  
**Drydex**  
for the Quadradyne"

10.15 a.m. THE DAILY

10.30 TIME SIGNAL GRF  
Forecast

10.45-11.0 THE CHIEF  
IN SUN  
Mrs. FRY

12.0 REGIN  
AT THE ORGAN

Time Sig

1.0 A Concert

- ALEC FEURMAN'S QUINTET
- Selection, Three Musketeers ..... Friml
  - Birthday Serenade ..... Lincke
  - En La Alhambra (Serenata) ..... Breton
  - Fairy Pipers ..... Brewer
  - Mozart Selection ..... Urbach
  - Waltz, Moonlight on the Alster .. Fetras
  - Don Juan (Serenade) ..... Tchaikovsky

2.0-2.30 Gramophone Records

3.0 EVENSON  
From W

3.15



Makers of the world famous Exide offer greatest dry battery value

Obtainable everywhere from all good dealers in sizes and types to suit every wireless set. Also for torches, pocket lamps, cycle lamps and bells.

For H.T.—Drydex Orange Triangle, Type H1015, 120 volts, Price 24/-.

For Grid Bias—Drydex Green Triangle, Type H1008, 16.5 volts, Price 2/6.

For L.T.—Use Exide, Type CZ5, 2 volt, 50 ampere hours, Price 15/-.

Exide Batteries, Exide Works, Clifton Junction, near Manchester. Branches: London, Manchester, Birmingham, Bristol, Glasgow, Dublin, Belfast.

Foundations of Music

Hilliers, B  
Green Guards, B  
VINE, ERNEST D  
BELLENDEN POWI  
R. A. BRANDON-CR  
A. NORMAN SHELL  
WALTER SCHOFFE  
GROOME

Time Signal, Greenwich

The Second 1

WEATHER FORECAST, S  
NEWS BULLETIN

9.15 Shipping Forecast;  
Market Report

9.20 IDLE THO  
Lady DIANA

9.35 GERSHIOM P  
and his SAXOPH  
And, if possible,  
THE LONDON

10.30-12.0 DANC  
BILLY MASON and  
BAND, from the

- Wayne .....
- Turnbull .....
- Pally .....
- Hubert Leslie
- Alban Blakelock
- Ivan Samson
- Brember Wills
- Frederick W. Lloyd
- Andrew Leigh
- Walter Hudd
- J. Sebastian Smith
- Wilfrid Grantham
- Rauswatters, Green

There is news in the "Wireless Magazine" advertisements

# On the Crest of the Waves

THE WORLD'S RADIO ACTIVITIES :: By JAY COOTE

**I**N Russia, with a view to popularising the broadcast programmes, the Soviet authorities have cancelled the listening tax and owners of receivers are no longer required to declare them. According to a recent communiqué the Soviet Union now controls fifty-five broadcast transmitters with power ranging from 3 to 100 kilowatts.

The Champ de l'Air transmitter, which for some years has relayed the



Do you know him? His name is Claude Cavalotti and he is a saxophonist

Lausanne programmes, is now exclusively used for aviation traffic.

An international radio telegraphy and telephony conference is to be held at Madrid (Spain) in September, 1932. It is at this general meeting that the question of extending the waveband allotted to broadcasting services will be raised.

## New Munich Transmitter

Work has been started on the new 75-kilowatt transmitter destined to take over the Munich programmes. The plant has been so planned that its power can be increased at short notice to 150 kilowatts. So far as can be anticipated, the 532.8-metre channel, now used for Munich, will be retained. It is hoped to bring the new station into operation in the course of next summer.

Contrary to previous reports, the power of the Trier (Treves, Germany) relay station will be 2 kilowatts. When

completed the transmitter will share a wavelength, namely 259.3 metres, with Frankfort-on-Main. The channel now used by the latter will be taken over by the new Leipzig super-power station already under construction.

With a view to making the Rome broadcasts more easily accessible to listeners in neighbouring countries the Prato Smeraldo short-wave station (2RO) transmits daily on 80 metres with an aerial power of 14 kilowatts.

The Tunis-Kasbah broadcasting station has been closed down temporarily while undergoing a complete reconstruction of its plant. For over two years the French military authorities, assisted by a local wireless association, have provided a restricted service of news and musical programmes. According to a report from Paris, the French State has been asked to assist in installing a station on similar lines to the one now operating in Algiers.

Gramophone records will no longer be heard in German radio programmes as both makers and dealers in that country have stated that these transmissions have adversely affected their sales. There is a possibility that registered listeners in Germany may fight this drastic measure as although, now and again, complaints have been lodged with the authorities to the effect that too much "canned music" was included in the daily wireless entertainments it is thought that a judicious amount of publicity given to the new productions induces the public to make purchases.

Radio Wallonie (Liège), one of the earliest private broadcasting stations opened in Belgium, after remaining idle for many months, has now resumed its transmissions. It may be heard on 208.3 metres (1,440 kilocycles) every Sunday evening between 5 and 7 p.m. and from 7.30 to 9.30 p.m. G.M.T. on Mondays, Wednesdays and Fridays. In addition, Liège also boasts of another toy broadcaster. The newcomer, Liège-Regional, on 215 metres, supplies concerts and news bulletins daily from midday until 1.30 p.m. G.M.T. and between 4 and 5 p.m.

The 12-kilowatt short-wave station erected by the Belgian authorities in the neighbourhood of Brussels for communication with the Congo and South America works on 15.62 metres during the day and on 29.04 metres at night.

With the closing down of the French Colonial Exhibition at Vincennes (Paris) the studio of the Pontoise transmitter has been transferred to the French capital. Radio Lille, with a view to tapping the Paris concerts, also possesses a studio in the same building.

According to an official report from the German Ministry of Posts and Telegraphs, the new Breslau, Leipzig and Frankfort-on-Main high-power stations will not be ready for testing before February, 1932. No definite date has been fixed for the super-transmitters destined to Berlin and Hamburg. In view of the adverse economic conditions prevailing in Germany there is a likelihood that the building of these stations may be postponed for some months.

Every Wednesday and Friday, from 9.30 p.m. G.M.T., Radio Alger relays dance music by the Jack Mill Jazz Orchestra playing at the Casino Municipal at Algiers.

## Short-wave Calls

As it has often been found necessary to communicate with the United States of America by wireless telegraphy, in connection with the relays of New York programmes carried out by the Zeesen (Berlin) short-wave station, the following call letters have been adopted, namely DJA for the 31.38-metre wave and DJB for the 19.737-metre channel.

If we are to believe a Chicago newspaper, all motor-cars should be equipped with radio receiving apparatus as on a recent occasion it enabled a Winnipeg (Canada) policeman to effect the capture of an automobile thief. It would appear that, having stolen a car in the United States, the man drove it to Winnipeg, (Continued on page 106)



Gretta Keller is a Continental cabaret singer: she is popular over here, too



# READY RADIO KITS

Matched, Tested and Passed by G. P. Kendall, B.Sc.

## 1932 SUPER 60

|  | £   | s.   | d.    |
|--|-----|------|-------|
| 1 Wooden panel   | ... | ...  | 2 6   |
| 1 Cabinet to specification   | ... | 1 12 | 6     |
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| 1 Lewcos band-pass filter coil, type B.P.F.  | ... | ...  | 12 0  |
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| 2 Lewcos super-het. intermediate with pig-tails, type I.F.T.P.                       | ... | 1 1  | 0     |
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| 1 T.C.C. .00005-mfd. fixed condenser, type 34  | ... | ...  | 1 6   |
| 1 T.C.C. .0002-mfd. fixed condenser, type 34   | ... | ...  | 1 6   |
| 1 T.C.C. .001-mfd. fixed condenser, type 34  | ... | ...  | 1 10  |
| 1 T.C.C. .01-mfd. fixed condenser, type S  | ... | ...  | 2 6   |
| 5 T.C.C. 1-mfd. fixed condensers, type 50  | ... | ...  | 14 2  |
| 2 T.C.C. 2-mfd. fixed condensers, type 50  | ... | ...  | 7 8   |
| 1 J.B. .0005-mfd. two-gang condenser, type R.2                                       | ... | ...  | 1 1 0 |
| 1 J.B. .0005-mfd. gang condenser, type R.1   | ... | ...  | 12 6  |
| 1 Readir-Rad 1-meg. leak and holder  | ... | ...  | 1 4   |
| 9 Junit valve holders  | ... | ...  | 6 0   |
| 4 Belling-Lee wander plugs   | ... | ...  | 8     |
| 10 Belling-Lee terminals, type B   | ... | ...  | 5 0   |
| 2 Lewcos 20,000-ohm spaghetti resistances  | ... | ...  | 3 0   |
| 1 Wearite 15-ohm rheostat  | ... | ...  | 1 9   |
| 5 Sovereign terminal blocks  | ... | ...  | 2 6   |
| 1 Pair Bulgin G.B. clips   | ... | ...  | 6     |
| 1 Readir-Rad fuse and holder   | ... | ...  | 1 3   |
| 1 Wearite 4-pole change-over switch with terminals and 8 in. extension rod, type 124 | ... | ...  | 5 6   |
| 1 R.I. L.F. transformer, ratio 1-7, type G.P.  | ... | ...  | 10 6  |
| 6 Valves as specified  | ... | 4    | 7 6   |
| 2 Packets of Jiffilinx for wiring  | ... | ...  | 5 0   |
| Flex, screws, etc.   | ... | ...  | 1 1   |
|  | £14 | 13   | 9     |

**KIT A** less valves and cabinet **£8-14-0**

**OR BY EASY PAYMENTS**  
**16/-** DOWN and 11 monthly payments of 16/-

**KIT B** with valves, less cabinet **£13-1-0**

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**TO OVERSEAS CUSTOMERS**  
 Everything radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon delivery of the goods. All goods are very carefully packed for export and insured, all charges forward.

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 Atlas A.C. 290, H.T., L.T. and Grid Bias.  
 Cash Price £6/10/-.
- 12/-** DOWN and 11 monthly payments of 12/-.  
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- Ekco D.C. Mains Unit. H.T. only. Cash Price £1/19/6.**  
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- Marconi Universal Gram. Motor, for A.C. or D.C. mains, with pick-up and volume control. Model D.**  
 Cash Price £4/12/6.
- 12/-** DOWN and 9 monthly payments of 10/-.  
**Collaro A.C. Induction Motor.** Cash Price £3.  
**6/-** DOWN and 10 monthly payments of 6/-.  
**Collaro Double Spring B.30.**  
 Cash Price £1/13/-.
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- LOUD-SPEAKERS**  
**R. & A. Permanent Magnet M/C Reproducer, with multi-ratio matching transformer.**  
 Cash Price £2/17/6.  
**9/-** DOWN and 6 monthly payments of 9/-.  
**Blue Spot Permanent Magnet Moving-coil Speaker Chassis, with transformer.**  
 Cash Price £3/15/-.

**JIFFILINX FOR SIMPLER WIRING**  
 Always use Jiffilinx for wiring. They eliminate soldering, give perfect contact, and are the most convenient, rapid, and neat method of wiring a set. Forty Jiffilinx in various lengths, fitted with shake-proof connectors, price 2/6.  
 Send for a packet to-day.

**A READY REFERENCE TO RADIO**  
 Our new 100-page fully illustrated Catalogue contains details of all modern radio products. You need a copy. Price 1/-, post free.

Be sure to read Kendall's book, entitled, "10 Hows for Modern Radio Constructors." Send four 1½d. stamps now.

- H.T. ACCUMULATOR**  
 Fuller, type D.M.H.G. 120 volts, 6,500 ma./hour capacity.  
 Cash Price £4/1/-.
- 7/6** DOWN and 11 monthly payments of 7/6.
- H.T. BATTERIES**  
**Pertrix Super Capacity, Type 301.** Cash Price £1/11/-.
- 6/-** DOWN and 5 monthly payments of 6/-.
- GRAMOPHONE EQUIPMENT**  
**A.E.D. Alpha Type Pick-up.**  
 Cash Price £2/2/-.
- 7/9** DOWN and 5 monthly payments of 7/9.
- B.T.H. Senior Type Pick-up.**  
 Cash Price £2/5/-.
- 8/3** DOWN and 5 monthly payments of 8/3.
- Blue Spot Type Pick-up.**  
 Cash Price £3/3/-.
- 8/6** DOWN and 7 monthly payments of 8/6.
- Marconi Gram. Motor, for A.C. or D.C. mains.**  
 Cash Price £2/12/6.
- 10/-** DOWN and 6 monthly payments of 8/-.

- 10/6** DOWN and 9 monthly payments of 8/-.
- Blue Spot Goliath, Type 30 P.M., in walnut cabinet.**  
 Cash Price £5/10/-.
- 10/-** DOWN and 11 monthly payments of 10/-.
- Blue Spot 44R, magnetic type, incorporating 66/R Unit, in oak cabinet.** Cash Price £2/12/6.
- 10/-** DOWN and 6 monthly payments of 8/-.
- Blue Spot 66/R Unit and Major Chassis.**  
 Cash Price £2/10/-.
- 7/6** DOWN and 6 monthly payments of 8/-.
- Epoch 99K de Luxe Permanent Magnetic M/C. Chassis only, with 4-ratio transformer.** Cash Price £7/7/-.
- 17/6** DOWN and 9 monthly payments of 16/-.
- Epoch 101 Energised Type Moving-coil Speaker, for 6-12-volt accumulator or 2-amp. charger.** Cash Price £6/15/-.
- 12/6** DOWN and 11 monthly payments of 12/6.

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Please dispatch to me at once the following goods .....

for which (a) I enclose (cross out line) £ .....  
 (b) I will pay on delivery (not applicable)  
 (c) I enclose first deposit of

NAME .....

ADDRESS .....

W.M. 2/32 Cash orders of 10/- or over post free

# ON THE CREST OF THE WAVES—Cont. from page 104



He plays throughou; vaudeville programmes  
—Sid Bright, the well-known pianist

whiling away the monotony of the drive by listening to the broadcasts picked up by the radio set. Unfortunately, as he was asking the Canadian policeman where to park, the latter heard through the loud-speaker a full description of the lost vehicle! Coincidences do happen, but . . .!

Publicity by microphone has now been forbidden by the Belgian authorities. In France, Spain, Germany, Hungary, Italy, Irish Free State and Poland, broadcasting stations are allowed to include a percentage of advertisements in the programmes broadcast; in Great Britain, Denmark, Holland, Sweden and Switzerland, the authorities have decided against this principle.

In Goerlitz (Germany) a special house was recently opened for persons suffering from deafness. In this building considerable use has been made of lights as against bells. Radio programmes picked up from the nearest main station are distributed to all rooms, which are liberally equipped with headphones, and private messages are also sent in this manner.

## The Voice of Holland

PCV, Kootwijk (Holland) regularly transmits a short news bulletin daily on 16.82 metres at 2.15 p.m. G.M.T. It is entitled "De Stem uit Nederland" (The Voice of Holland) and immediately precedes private telephony traffic with Java (Dutch East Indies).

The new 75-kilowatt station which the E.I.A.R. (Italy) are erecting at Ciziano for the transmission of the Milan radio programmes will be completed in the spring of the year.

On the eighty-fourth storey of the Empire Building, New York, the National

Broadcasting Company has erected special studios for broadcasting and television transmissions. These experiments are to be carried out on wavelengths between 3.7 and 7 metres.

During the winter months the programmes from Brussels (No. 1) are to be extended; as an additional feature a running commentary will be made on football matches taking place at the St. Gilles Stadium in the Belgian capital.

As owing to financial losses the famous Kroll Opera House was on the verge of bankruptcy the German Reichsfunk decided to run the theatre for the benefit of radio listeners. Public performances to which registered listeners are admitted at reduced prices are sometimes broadcast and the theatre is also used as a super studio for the Berlin concerts.

The Senate and House of Representatives at Havana (Cuba) has been wired for sound reproduction. There is one microphone for the president and forty instruments for the members. If one of the latter desires to speak he presses a button, thus obtaining connection with a central board. The operator obtains permission from the President and by means of a tell-tale lamp informs the member. The speech is then broadcast throughout the building.

Criminal news items and announcements are broadcast daily by the Munich police authorities on 1,340 metres between 6 and 7 a.m. and again between 6 and 7 p.m. G.M.T.

Wireless exchanges for the supply of radio programmes to telephone subscribers have become very popular in Holland. Groningen is the latest town to adopt this system and for a small annual charge provides its listeners with a choice

of six broadcast entertainments, including the main features of the daily transmissions from the Huizen and Hilversum studios.

Paris wireless journals are noted for their peculiar inaccuracy in all reports appertaining to foreign radio news. In a recent publication a statement was made to the effect that for its transfer from Savoy Hill to Broadcasting House the B.B.C. officials had organised a stately procession on the lines of the Lord Mayor's Show. According to the Paris contributor, the *cortège* in question "was headed by the B.B.C. Director-General followed by Jack Payne's dance band, a staff of engineers and the editors of the corporation's publications"!

## Work Stopped in France

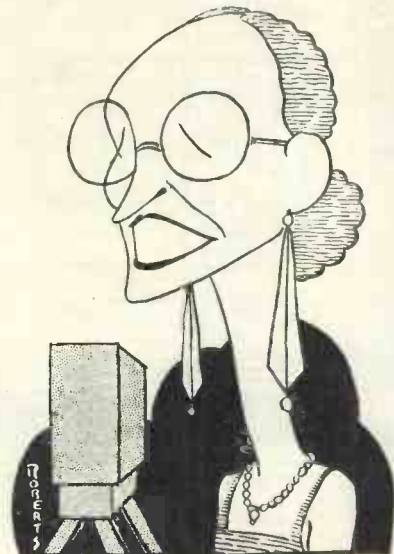
Work on the Lille 15-kilowatt transmitter has been stopped by order of the French Ministry of Posts and Telegraphs, who, in anticipation of the adoption of the General Ferrière scheme for the reorganisation of the state broadcasting net, has promised to erect on the same site a station capable of radiating 60 kilowatts in the aerial.

Although the Principality of Monaco will not possess a broadcasting station, residents on the French Riviera have been promised a high-power transmitter in the neighbourhood of Nice or Cannes. Whichever site is chosen, the French P.T.T. proposes to install a number of studios in the best-known health resorts bordering on the Mediterranean in order to tap the programmes offered by the local casinos.

According to official statistics, listeners in Germany make greater use of their receivers than do those of other countries. It has been computed that 90 per cent. of the total number receive the local programmes for an average period of four hours daily, whilst some 20 per cent, interested in transatlantic transmissions, are still working their sets at 3 a.m. In proportion to the general population, assessed at the last census at 64,484,000 souls, the percentage of registered listeners in that country works out at 5.77 per cent. of the inhabitants.

## New Wired-wireless System

A new wired-wireless system for the reception of the local programmes has been installed by the Swiss Post and Telegraph authorities in the cities of Basle, Berne, Geneva, Lausanne and Zurich. It is claimed that perfect reproduction of the broadcasts without any trace of interference from neighbouring electrical establishments can be guaranteed. No special apparatus is required by telephone subscribers and a suitable loud-speaker is supplied at a low annual rental. In the event of incoming or outgoing telephone calls the local exchange automatically switches out the broadcast entertainment and re-connects the subscriber when the conversation is ended.



Esther Coleman is a popular contralto you must have heard over the ether

# for the 1932 'SUPER SIXTY'

Specified for the Battery and All Mains Models



## R.I. 7 to 1 TRANSFORMER

Specified for the "Wireless Magazine" 1932 "Super 60" and other circuits employing high ratio amplification the R.I. 7 to 1 model gives exceptionally high amplification with amazing uniformity over all wanted frequencies with the complete elimination of all interference frequencies—ensuring utmost perfection in reception. It is the centre-piece of the circuit which can be depended upon for really good results. It is a big transformer, encased in black bakelite and constitutes the finest value at its extraordinary price.

List No. D Y 21A.  
Size: 3 3/4 x 1 1/4 x 2 1/4 in. high  
Weight: 1 lb

10/6

Wherever absolute dependability with low cost is imperative, R.I. components are always specified. They are built to a purpose—not to a price, although they cost less than the others, efficiency considered. To buy R.I. components is not experimental, it is the sensible choice of set builders who utilise the best that Radio Science can give to determine absolutely certain results.



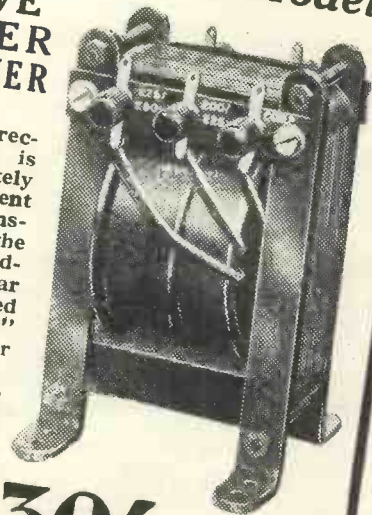
The technical information supplied with all R.I. transformers is the guarantee before you buy that they will do their job—there is no speculation about R.I. productions. Ask for free literature.

## Recommended for the All Mains Model R.I. VALVE RECTIFIER TRANSFORMER Type E.Y. 30

The popular valve rectifier mains unit is rendered definitely surer and more efficient by fitting the R.I. transformers of which the E.Y.30, a really dependable model at a popular price, is recommended by "Wireless Magazine" for the "1932 Super 60."

For use with the standard full wave rectifying valves, including Mullard, Mazda, Osram, etc.

List No. E.Y. 30. Output:—  
250 volts-0-250 volts.  
60 milliamps.  
4 volt, centre tapped, 1 amp.  
4 volt, centre tapped, 5 amp.



30/6

# Our Tests of New Apparatus

Dubilier Fixed Condensers :: Lanchester Junior Loud-speaker ::  
 Amplion Moving-coil Loud-speaker :: Igranic Moving-coil  
 Loud-speaker :: Permcol Panels :: Telsen Loud-speaker  
 Unit :: Bultin Combination Control

## DUBILIER FIXED CONDENSERS

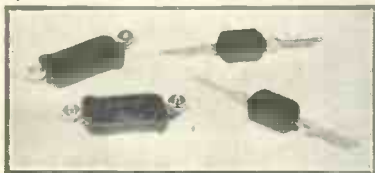
APPARATUS: Fixed condensers, (a) type 665 and (b) type 670.

PRICES: (a) .0001 to .0003 microfarad, 6d.; .0005 microfarad, 9d.; (b) .0001 to .0003 microfarad, 1s.; .0005 to .006, 1s. 6d.

MAKERS: Dubilier Condenser Co. (1925) Ltd.

TWO very cheap and neatly made ranges of fixed condensers have recently been introduced by Dubilier. These are the types 665 and 670, which are both of the bakelite-moulded type.

The type 665 condensers, which sell at 6d., can be had in capacities ranging from .0001 to .0005 microfarad, and are supplied with long soldering tags for connections. They can thus be included as part of the wiring of the receiver.



USEFUL FIXED CONDENSERS

On the left are samples of the Dubilier type 670 condensers, while the type 665 are seen on the right

The type 670 is arranged for screwing to the baseboard and has terminals with small soldering tags for connections. This type can be obtained in capacities ranging from .0001 to .006 microfarad, the price, ranging from 1s. to 1s. 6d.

These condensers have been produced with the intention of providing a cheap range having reasonable accuracy. Several samples of both types were tested and all were found to be reasonably close to their rated value. These condensers should certainly be considered when building a new receiver.

## LANCHESTER JUNIOR LOUD-SPEAKER

APPARATUS: Permanent-magnet moving-coil loud-speaker, type Junior.

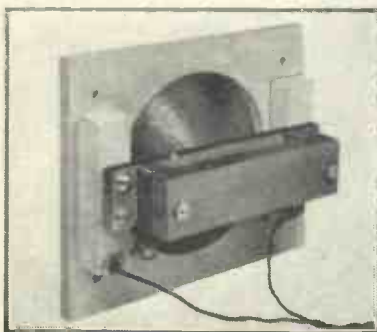
PRICE: £1 10s. (Input transformer, 11s.).  
 MAKERS: Lanchester Laboratories, Ltd.

A VERY interesting mid-gig permanent-magnet moving-coil loud-speaker is the Lanchester Junior model. This has a diaphragm which is only 4½ in. in diameter and ¾ in. deep, suspended by felt from a small baffle board measuring 9 in. by 7 in.

The moving coil itself has a diameter of ¾ in. and is of the low-resistance type, requiring an input transformer with a ratio of approximately 40 to 1 to 70 to 1, depending on the type of output valve in use.

The magnet employed is of a bar type

and measures some 6½ in. by 1½ in. by ¾ in. and is magnetised in such a way that one pole is at the centre, with opposite and like poles at the ends. The magnetic circuit is completed through a yoke which forms the outer boundary of the gap through which the coil moves.



SMALL BUT GOOD

A bar magnet is used for the Lanchester Junior moving-coil loud-speaker

The centre polepiece is not fastened in any way to the magnet, but is held in position over the central magnetic pole by means of the attraction. It is, however, accurately positioned by means of a brass collar which fits into a slot in the yoke.

No centring device in the usual sense has been used on the moving coil, but this is held in position by means of a small rubber ring which just fits the inside diameter of the coil, and which is itself located by a small slot in the polepiece.

## Good Results on Test

The results from the loud-speaker were very good, considering its small size. The frequency response appeared more or less uniform from 100 cycles up to 3,500 cycles, the output falling off outside these limits. The sensitivity was quite up to standard, and the reproducer should give satisfactory results with inputs of a few hundred milliwatts.

## AMPLION PERMANENT-MAGNET MOVING-COIL LOUD-SPEAKER

APPARATUS: Permanent-magnet moving-coil loud-speaker, type MC9.

PRICE: £6 (Input transformer, 15s.).

MAKERS: Graham Amplion, Ltd.

A GOOD permanent-magnet moving-coil loud-speaker which we have tested this month is the Amplion type MC9. This loud-speaker employs a massive pot-type permanent magnet, rather like a doughnut in appearance. The magnet is bolted to a very rigid metal chassis from which is suspended a

10-in. diaphragm by means of a felt surround. This diaphragm is constructed from stiff paper and is corrugated to give strength.

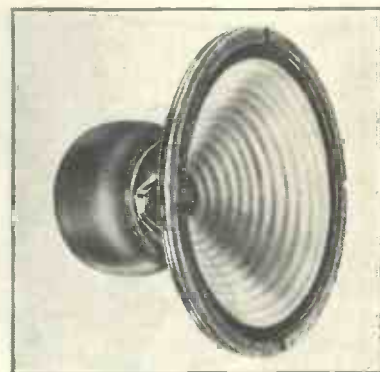
The diaphragm has a steeper angle than is usual for this class of loud-speaker, the angle at the apex being less than 90 degrees. The centring device is of the familiar spider type, the arms being ribbed to give greater stiffness. Despite this general rigidity of construction, the surround and centring device allow ample movement of the diaphragm, and thus the displacement required at low frequencies is not in any way restricted.

## Low-resistance Coil

The moving coil itself is of the low-resistance type, requiring an input transformer, the ratio varying approximately from 15 to 1 to 50 to 1, depending on the type of output valve used in the amplifier supplying the loud-speaker.

A special transformer is marketed for use with this reproducer and it is recommended that this should be used in order to obtain the best results.

On test the instrument was mounted behind a 3-ft. baffle board, and the special transformer used. The results obtained were good, the reproduction of



A REPRODUCER FOR LARGE SETS

This loud-speaker is the largest moving-coil model in the Amplion range and is suitable for use with the largest sets

both speech and music being very natural, with no trace of boominess or paper rattle.

The sensitivity was up to standard and was, in fact, very nearly equal to that of our standard mains-energised loud-speaker. At the same time the instrument appeared to be able to handle large inputs without distress. It is well made and is good value for money.

(Continued on page 110)



**TYPE  
PZ2**

**A RADIO BATTERY  
DESIGNED FOR  
RADIO**

**CAPACITY  
35  
AMPERE HOURS**  
WHEN DISCHARGED AT  
THE RATE OF 0.35 Amps

Rate of charge  
**2 Amperes**  
Length.... 7 <sup>1</sup>/<sub>2</sub> inches  
Width.... 3 <sup>5</sup>/<sub>8</sub> inches  
Height... 4 <sup>1</sup>/<sub>2</sub> inches

**PRICE  
10/-**

**MADE IN  
ENGLAND  
BY**

The "low-bult" and "robust" construction of this accumulator makes it difficult to be knocked over and prevents breakage . . . fits practically any set with ease . . . provided with gravity indicator which tells when to recharge . . . the "Kaptive Karrier" affords great convenience in transportation . . . non-interchangeable terminal nuts prevent mistakes in Charging . . . no separators — the plates are held firmly in position by the ribs moulded in the clear, white glass box.

Because of their special construction, the sturdy plates, <sup>1</sup>/<sub>4</sub>" thick, are capable of withstanding heavy rates of charge and discharge which makes this accumulator ideal for modern, high-powered multi-valve receiving sets.

Your dealer can supply this modern accumulator, but should he happen to be out of stock please write and tell us his name and address and we will see that you are supplied.

**PERTRIX**  
TRADE MARK  
**ACCUMULATORS**

**BRITANNIA BATTERIES LIMITED**

Advert. of Britannia Batteries Limited, 233, Shaftesbury Avenue, London, W.C.2.  
Telephone: Temple Bar 7971 (5 lines). Works: Redditch.

*It helps us if you mention "Wireless Magazine"*

# OUR TESTS OF NEW APPARATUS—Cont. from page 108

## SPECIAL NOTE

Manufacturers are invited to send apparatus to "Wireless Magazine" for test and report in these pages. Only those instruments that reach a certain standard of merit will be reviewed, however.

Readers who would like to see reports on any special components are also invited to communicate with the Editor.

## IGRANIC MOVING-COIL LOUD-SPEAKER

**APPARATUS:** Permanent-magnet moving-coil loud-speaker.

**PRICE:** £3 (input transformer, 7s. 6d.)

**MAKERS:** Igranic Electric Co., Ltd.

A NEW permanent-magnet moving-coil loud-speaker is that manufactured by the Igranic Electric Co., Ltd.



A WELL-MADE LOUD-SPEAKER

This is the new Igranic permanent-magnet moving-coil reproducer

A massive cast-metal chassis supports a large cross-type permanent magnet which is copper plated to prevent rusting.

The diaphragm is of the doped-fabric type, approximately 7½ in. in diameter, and has its suspension formed as a part of its outer edge, which is corrugated to give it the necessary flexibility.

The moving coil itself is approximately 1½ in. in diameter and is of the usual low-resistance type requiring an input transformer, which is provided with the loud-speaker and mounted on one of the webs of the chassis. This transformer is of the constant-inductance type and is provided with exceptionally large terminals for the external connections.

## Centring Device

The centring device is constructed of the same material as the cone, and is held into position on the central pole-piece by means of a screw. Holes are provided in the outer ring of the chassis to enable the loud-speaker to be bolted or screwed to the cabinet or baffle with which it is to be used. A felt ring is also included on the outer edge to give a good connection between the loud-speaker and the baffle.

The instrument gave very pleasant results, the reproduction of speech and music being good. The frequency response appeared fairly uniform from 100 to 3,500 cycles. The sensitivity was, if anything, perhaps a little below normal, but the loud-speaker will give satisfactory results on inputs of as little as half a watt.

## PERMCOLO PANELS

**APPARATUS:** Ebonite panels, black and mahogany polished and matt finishes, all standard sizes.

**PRICES:** 7 in. by 14 in., 3s. 6d. (black), and 4s. 3d. (mahogany), 3/16 in. thick.

**MAKERS:** British Hard Rubber Co., Ltd.

BROADLY speaking, there are two main points in connection with a radio receiver which have to be considered, performance and appearance.

For a good appearance combined with ease of working a first-class ebonite panel is very often used. One trouble often experienced when using ebonite panels is that after exposure to strong light bad discoloration takes place and the appearance of the receiver is spoiled.

The Permclo range of panels introduced by the British Hard Rubber Co. is specially made to overcome this trouble.

Permclo ebonite is similar to the highest grade ordinary ebonite with the exception that it does not discolour. Prolonged tests have been made by the makers to prove that this is so, and certainly there is no trace of discoloration in the case of a sample which we have had for some considerable time.

The electrical properties of the ebonite appeared to be most satisfactory; it is easy to work and looks well when finished. This ebonite is certainly worth considering when purchasing a panel for the new receiver.

## TELSEN LOUD-SPEAKER UNIT

**APPARATUS:** Moving-iron loud-speaker unit.

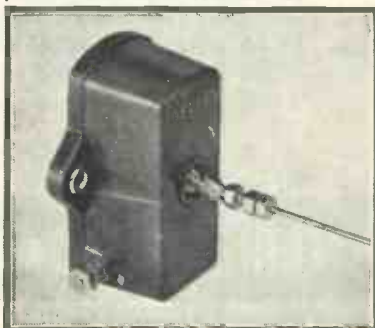
**PRICE:** 5s. 6d.

**MAKERS:** Telsen Electric, Ltd.

A NEW moving-iron loud-speaker unit which we have recently tested is that manufactured by Telsen Electric, Ltd. This unit is very small and neatly made, with the usual good quality finish associated with Telsen products.

The unit is built up on a metal base, two small bar magnets being used located side by side, but about ¼ in. apart. At one end, and acting as a bridge to the end of the magnet, is mounted a small polepiece, the operating coil being fixed over it. The L-shaped armature is clamped firmly against the other ends of the magnets, which are thus effectively in parallel.

The free end of the armature is positioned just clear of the polepiece, its actual position being adjustable by means of a spring and screw which is operated from the back of the unit.



GIVES EXCELLENT RESULTS

In spite of its low price the Telsen loud-speaker unit gives excellent results

The whole design of the unit is very simple and the construction is neatly carried out. A brown moulded-bakelite case encloses the unit, and lugs are provided at the back to facilitate mounting.

The unit was tested with a 10-in. diaphragm and the results obtained were excellent for so small and cheap a unit, both speech and music being reproduced very pleasantly.

The sensitivity was up to standard, while the power-handling capacity could be adjusted within reasonable limits by altering the position of the free end of the armature relative to the polepiece.

## BULGIN COMBINATION CONTROL

**APPARATUS:** Combined potentiometer and switch, type S90.

**PRICE:** 5s. 6d.

**MAKERS:** A. F. Bulgin & Co., Ltd.

AN ingenious component which we have received for test is the combined potentiometer and on-off switch just placed on the market by A. F.



A USEFUL COMBINATION

This is a Bulgin combined potentiometer and switch, a most useful control

Bulgin & Co., Ltd. The construction is very simple, consisting of an ordinary wire-wound potentiometer and on-off switch mounted on a small bracket at the back, the switch being operated by means of a small lever arm moving with the contact arm of the potentiometer.

This lever is so positioned that the switch is operated just as the potentiometer reaches the end of its movement. Such a switch could be used, for example, for switching off the set when the volume control had been reduced to a minimum.

## Protecting Cover

The potentiometer is well made, the resistance winding being protected by means of a covering of transparent material.

Another favourable point is that the contact arm does not move on the winding itself, but presses down on to a thin ring of metal, which is normally held away by its own springiness. Thus danger of damage to the thin resistance wire is eliminated.

The switch is of the quick-action type, rated to break 3 amperes at 250 volts.

The body of the component is of moulded bakelite finished in the familiar Bulgin mottled-green colour. The component is arranged for one-hole fixing and can be recommended.

# WEARITE COMPONENTS

## FIRST and FOREMOST

WEARITE SUPER-HET COILS designed by a radio expert of international repute, and guaranteed to within .5 of 1 per cent accuracy of matching.

These coils made the introduction of the **MODERN SUPER-HETERODYNE RECEIVER** possible.

BRITISH MADE IN OUR OWN WORKS  
UNDER BRITISH PATENT No. 349403.

BY USING THESE COILS IN THE

## “1932 SUPER 60”

GOOD RESULTS ARE BOUND TO FOLLOW



15-ohm Rheostat with bracket

Price 1/9



25,000 ohms wire-wound Potentiometer, with bracket. List Q.34.1S

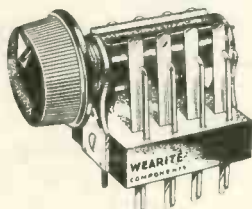
Price 4/3

5,000 ohms Potentiometer to carry up to 5 m/a. List Q.30

Price 4/-

1-way rotary-type Switch. List I. 21.

Price 3/3. Supplied with brackets 3/6



1.24. With terminals, two brackets and 8-in. extension rod

Price 5/6

### SPECIAL LINES FOR “QUADRADYNE”

.25 megohm Potentiometer, ganged with G.24 Push-pull Change-over Switch. Complete unit. Price 6/9

50,000 ohms wire-wound Potentiometer, ganged with G.22 On-off Switch. Complete unit Price 5/6

The above lines are supplied complete with brackets Write for Free Lists

“QUADRADYNE”  
“PLUG-IN-COIL THREE”  
“1932 A.C. SUPER 60”



H.F.S. Choke, replacing H.F.O. type Price 8/6

Stories of the Operas

# Carmen

DON JOSÉ, a Corporal of Dragoons . . . Tenor  
 ESCAMILLO, a toreador . . . . . Baritone  
 EL DANCAIRO } smugglers { . . . . . Baritone  
 EL REMENDADO } . . . . . Tenor  
 ZUNIGA, a captain . . . . . Bass  
 MORALES, an officer . . . . . Bass  
 MICAELA, a peasant girl . . . . . Soprano  
 FRASQUITA and MERCEDES, gypsies  
 Mezzo-soprani  
 CARMEN, a cigarette girl and gypsy . . . . . Soprano

Place : Seville, Spain.  
 Time : About 1280.

(Bizet)  
 ACT I

A square in Seville ; on right the gate of a cigarette factory. Morales and other soldiers lounging about ; people coming and going. Micaela, a peasant girl, seeks Don José ; the soldiers flirt with her and she runs off. At the charging of the guard Don José appears and tells his friends he is in love with Micaela.

The bells at the factory sound the work hour and the girls pour in through the gate. Carmen, a dark gypsy, dances in the square. She tries to attract José's attention, throwing him a red cassia flower, and runs into the factory. José picks up the flower and inhales its perfume, thrusting it into his blouse over his heart.

Micaela enters at that moment and José feels free from a kind of spell the gypsy has cast over him. Cries of terror and the entry of girls from the factory into the square reveal the fact that Carmen, in a quarrel, has wounded another girl with a knife. She is arrested, bound, and left in Don José's care.

She asks where the flower is. He undoes the binding knot, but soldiers appear and she is removed to prison. Going over the bridge, she effects her escape.

ACT II

A tavern. Dining table in confusion. Carmen dances and sings to the officers. Escamillo, the famous toreador, enters and sings. He is attracted to Carmen. She likes him, but still remembers José, who has been under arrest since he allowed her to escape but who is now free. The tavern-keeper closes the shutters.

Two smugglers enter. They need the help of three girls for their plans ; Carmen is persuaded to try to win José to become one of their band. He enters shortly after and Carmen dances for him. He hesitates to

desert and follows her to the mountains, but succumbs.

ACT III

A mountain scene. José finds Carmen fickle and is ill at ease amongst smugglers ; yet he is insanely jealous of her. While the smugglers convey the contraband through the pass José is left on guard.

A guide arrives and with him Micaela, bent on saving José. Escamillo tells José he seeks Carmen ; a fight with knives ensues. The smugglers hold José and the toreador leaves. Micaela persuades José to go also.

ACT IV

A square in Seville. At the back the entrance to the arena. It is the day of the bull fight. A great and excited crowd. Carmen is warned not to stay in the square, as José may be lurking about. He suddenly faces her. She refuses to have anything to do with him. She admits her love for the victorious toreador.

The doors of the arena open. She makes a dash for the entrance, but José stabs her to death. "I am your prisoner," he says to an officer. Then, "Carmen, I love you," as he bends over the body of the dead gypsy girl.

WHITAKER-WILSON.

## Coils for the "New Economy" Sets

**B**OTH the New Economy Three (described in the December "Wireless Magazine") and the New Economy Two (described in January) have created a great deal of interest among constructors everywhere and already hundreds of models of each set have been built.

### Home-made Coils

One of the chief points of interest about these sets is the fact that the tuning coils can be made at home very simply and at small cost. In this connection the Ewebec formers supplied by the Evington Electric and Radio Service of 5 Beckingham Road, Leicester, are worthy of mention.

These formers, which are of the slotted type, make possible the construction of coils with low self-capacities. Their arrangement will be clear from the photographs reproduced on this

page. The price of the formers is 1s. 3d. each.

Complete coils for the New Economy sets, wound on the Ewebec formers, are available and two of them are illustrated here. The coils have been tested by "Wireless Magazine" and found to be satis-

factory in every way. Prospective constructors of either of the sets can get further details of these coils from the manufacturers.

Readers are reminded that full-size constructional blueprints of both these sets can be obtained from the "Wireless Magazine" Blueprint

### COMPLETE COILS AND FORMERS

On the right are two Evington coils for the New Economy Three, while below is an Ewebec coil former suitable for winding the coils at home



Dept. The price is 1s. each, post free. If you are thinking of building the two-valver ask for No. WM265, and if you want the three-valver mention No. WM263 in your order.

A limited number of copies of "Wireless Magazine," containing full details of these sets is available from the publisher at 1s. 3d. each.





# THE PEAK OF BRITISH RADIO PERFORMANCE and VALUE



MOVING-COIL LOUD-SPEAKER, ONE-KNOB TUNING, DIAL IN ACTUAL WAVELENGTHS



TABLE CONSOLE

AN AMAZING ALL-MAINS  
MOVING-COIL RECEIVER

**F**AR above the general level of 3-valve receivers, the LOTUS Table Console is the crowning achievement of the British Radio Industry.

It embodies all the latest features of modern design, Moving Coil Loud-speaker, All-Mains Operation, Metal Chassis, totally screened and precision matched coils and condensers, single knob tuning, dial in actual wavelengths, and provision for gramophone pick-up. The price is miraculously low, only

**27/9** DOWN

Its performance must be tested to be believed. Splendid selectivity, British and Foreign stations rolling in by the rotation of a single knob, each clear cut and powerful, while the reproduction is beyond criticism—high and low notes, whispers and shouts with absolute fidelity. Self-contained in a beautiful walnut cabinet for A.C. and D.C. Mains.

**CASH PRICE £15.15.0**

Model for Battery Operation with Balanced Armature Speaker £9 9s. cash or 17/9 down.

Ask your dealer for a demonstration, and send coupon for leaflets describing the "Peak of British Radio Value"—the LOTUS Table Console.

**POST THIS COUPON NOW**

LOTUS RADIO, LTD.,  
Mill Lane, Liverpool.

Please send me free descriptive leaflets of the wonderful new LOTUS Table Console.

Name .....

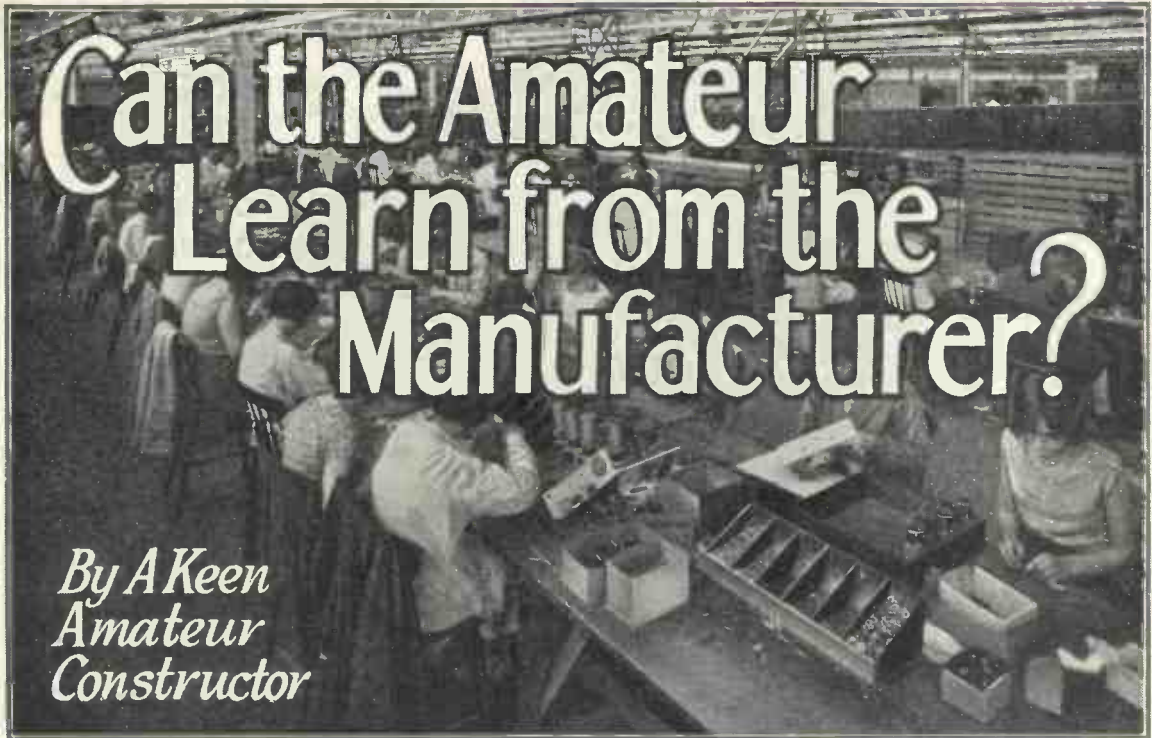
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W.M.S. ....



**LOTUS RADIO LTD., Mill Lane, LIVERPOOL**

*Better service results from mentioning "Wireless Magazine" when writing to advertisers*



MASS PRODUCTION OF SETS IN A BRITISH FACTORY

A scene in the well-equipped Kolster Brandes factory at Sidcup, where mass-production methods are used throughout with great success. This photograph shows the assembly of receiver chassis.

LIKE every observant amateur, I have noticed that this year's manufactured sets incorporate many points of design not found in amateur-made sets. I have been looking into some of the leading receivers to see whether any commercial practice could be utilised by the amateur, and in this article I outline my conclusions.

### Mains-operated Circuit

I can say at once that much of the difference between the factory- and home-built sets can be traced to the almost universal concentration on mains-operated sets at the radio factories. This is in contrast with the widespread construction of battery sets among amateurs.

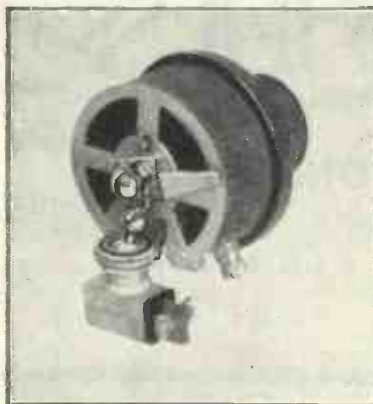
It might be said with great truth that what is the exception with the set manufacturer—the battery-operated set—is the rule with the amateur.

Because of this concentration on mains sets, which are generally more sensitive than battery sets, we find much more screening in the factory set than in the home-built set. We can, in fact, trace a broad distinction between the layout of factory sets and amateur sets; the

panel and baseboard are still the mainstays of the amateur, whereas the metal chassis is to be found in all the latest factory sets.

Can we amateurs learn anything from the manufacturer about layout? In other words, should we abandon the ebonite panel and wooden baseboard, and change over to an aluminium chassis for mounting our components?

That is, indeed, a difficult question, which I shall not attempt conclusively to answer, because at



COMBINATION CONTROL

This is a Bulgin combined potentiometer and switch. See the test report on page 110 of this issue

the moment the amateur is trying out this new system of construction and we must await the verdict of experience. There are points for and against the change.

Undoubtedly, the metal chassis lends itself to sound engineering, to a clean layout of coils and condensers, and to complete screening of the low-frequency parts from the high-frequency parts.

### Built from Blueprints

Against this we must remember that most amateur sets are built up from published blueprints; with a panel and baseboard layout the individual constructor has some scope for changing the specified parts for parts he may have on hand; whereas in a metal-chassis layout, involving a ready-drilled chassis, the specified parts must be used, unless fresh holes are drilled.

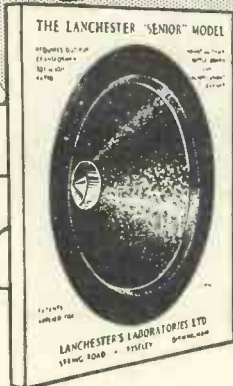
Often the restricted space under the chassis prevents alternative parts from being used even if the constructor is prepared to drill extra holes.

No; I cannot see the average amateur constructor going over completely to the manufacturer's metal chassis layout, although certain out-

(Continued on page 116)

# Lanchester MOVING COIL Speakers

**COBALT STEEL  
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MAGNET**



Designed by F. W. Lanchester (the originator of the Lanchester Car) and produced under his personal supervision.

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| “SENIOR”         | £2.18.0 | „          | £4.0.0  |
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| “JUNIOR”         | £1.10.0 | „          | £2.10.0 |

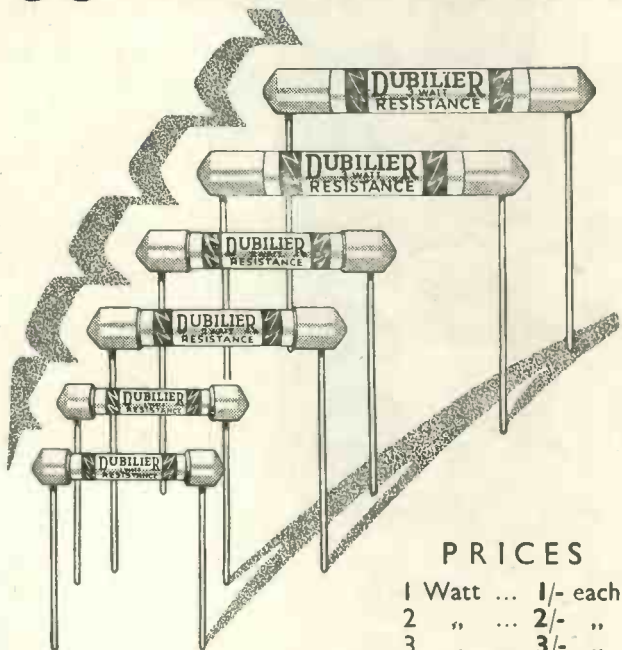
Output Transformer extra. See Catalogue.

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**PRICES**

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| 1 Watt ... | 1/- each |
| 2 " ...    | 2/- "    |
| 3 " ...    | 3/- "    |

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They are suitable for voltage dropping, decoupling and providing automatic grid bias voltages, and wherever a reliable resistance is required.

They can be mounted in clips; but connecting leads are fitted in addition.

Ducon Works,  
Victoria Rd., N. Acton, London, W.3  
—D.I.—

Advertisers like to know you "saw it in the 'Wireless Magazine'"

# AMATEUR AND MANUFACTURER—Cont. from page 114



**A REMOTE CONTROL**

A remote volume control, for placing on the arm of a chair, made by the Marconiphone Co., Ltd.

standing constructors' sets will, in the future, break away from the panel and baseboard—more in the interests of high-frequency stability than anything else.

While on the subject of layouts, it must have struck the amateur how often the modern factory product contains not merely the set and power supply, but also the loud-speaker. Should the amateur follow suit?

## Less of a Fixture

I think not, because the amateur set is much less of a fixture than the factory set and if the loud-speaker is incorporated in the cabinet of the home-made set its use for experimental purposes will consequently be lost.

Then again, there is no doubt that many moving-coil loud-speakers lose in extreme bass response by boxing them into cabinets.

So much for the differences between layouts—and it looks to me as though, in general, the amateur has little to learn from the manufacturer, and less to gain by emulating his ideas.

Now what about control—does not the factory set beat the amateur set in this very important respect? I am afraid so. But it just depends on your attitude towards control; if you mean to aim at simplicity of control, look to the modern factory set, with its ingenious knobs doing two, three or even four jobs of switching.

Here I think the component maker might help the amateur to compete with his commercial rivals. There is no reason why we amateurs should be deprived of multi-purpose switches. For example, we could do with a simple switch that would change over from medium to long waves and switch the batteries off in a third position.

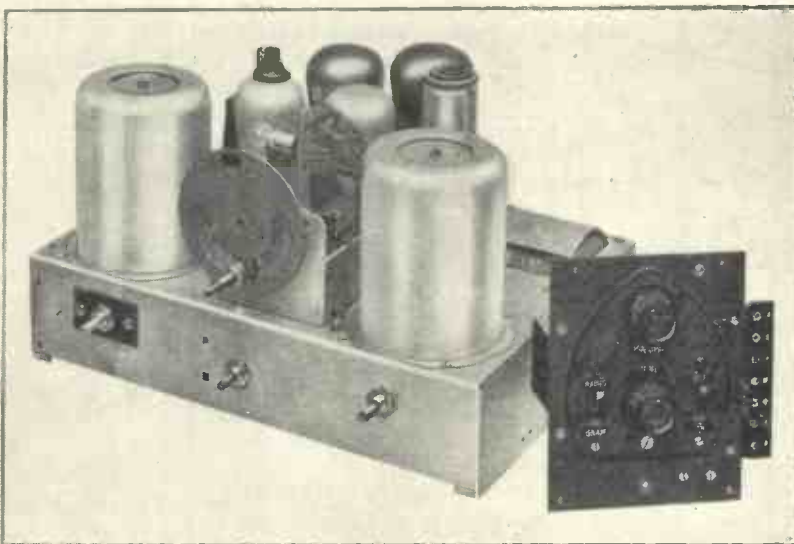
Another combination switch-knob which would prove of value in sets fitted with pick-up terminals would be one that changed over from radio

development in dual volume controls, so that radio and gramophone reproduction could be controlled by a single knob working a spindle ganged to two separately connected potentiometers. We want these dual controls—but at moderate prices.

## Amateurs Badly Beaten

When we compare the tuning controls of the amateur set with those of the factory product we have to admit that we amateurs are again badly beaten. The outstanding advantage of the factory set is the illuminated tuning scale.

Can we light up the tuning of the home-built set? Not quite so easily, because, owing to battery operation, we have to consider the extra drain exercised on the filament accumulator by the bulb necessary to illuminate the scale.



**HOW MANUFACTURERS SCREEN THEIR SETS FOR STABILITY**

A good example of modern commercial screening practice. The photograph shows the chassis and control panel of the Kolster Brandes radio gramophone

to gramophone reproduction and changed from medium to long waves.

This type of switch knob would make for cleaner panel layouts, and would not deprive the enthusiast of the fun to be derived from a multiplicity of tuning and volume controls.

Which leads me to the question of volume control, so sadly neglected in many of the amateur-built sets. There is a lot to be said, surely, for the type of volume control that, at its minimum position, acts as a battery-off switch?

Then there ought to be more

If the question of illumination is shelved, there is no reason why amateurs should put up with the type of dial now in common use—namely, a rotating dial with a fixed pointer. The best factory sets have the great operating advantage of a fixed scale with a horizontally moving pointer.

Without going even to the slight complication of a cord drive between the knob and the scale pointer I would suggest that the makers of dials might look into the possibilities of rotating pointers generally, and

(Continued on page 118)

# BUILT FOR BEST RESULTS

Practically every modern circuit uses gang tuning : but results depend entirely on the accuracy and construction of the gang condenser used.

That is why the new J.B. "R" Type Gangs are being specified in so many leading circuits. They are precision instruments, built for best results.

## J.B. "R" TYPE GANGS

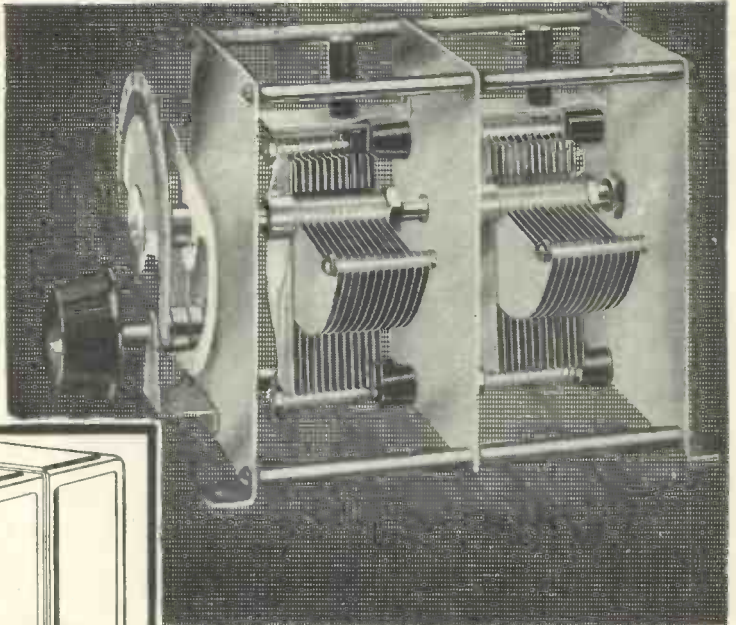
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Very easily fitted—only round panel holes to cut.

.0001 Trimmers (for adjustment once only) in each stage.

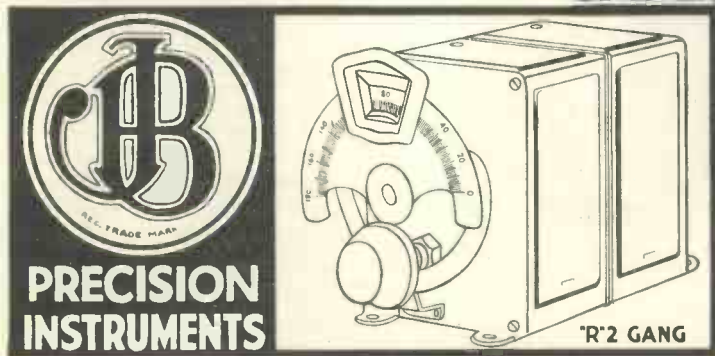
Complete with Vernier Disc Drive and Bakelite Panel Plate.

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|------------------------------------|---------|
| Type "R" 2 (2-gang) as illustrated | .. 21/- |
| Type "R" 3 (3-gang) .. .. .        | .. 29/6 |
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| (Capacity .0005).                  |         |



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## Specified for the Ether Rover MAGNUM DISSOLVER

**10/-**

## Specified for the New Plug-in Coil Three MAGNUM SPAGHETTI RESISTANCES

- |             |     |          |
|-------------|-----|----------|
| 20,000 ohms | - - | 1/6 each |
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300 to 1,000 ohms, 9d.  
2,000 to 10,000 ohms, 1/-  
15,000 to 100,000 ohms, 1/6  
150,000 ohms, 2/6

A list of leading short-wave stations together with an interesting booklet describing the famous Stenode Receiver, Magnum Mains Sets and high-grade components.—Free on request.

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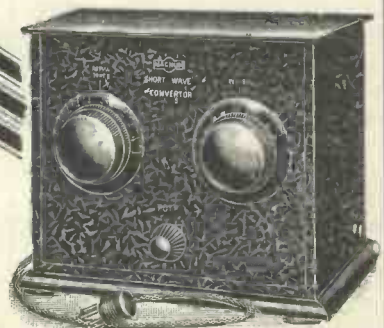
No extras are required and it can be connected in a few seconds.

Supplied complete and ready for use including two coils 20/40 and 40/80 metres, Plug and Adaptor.

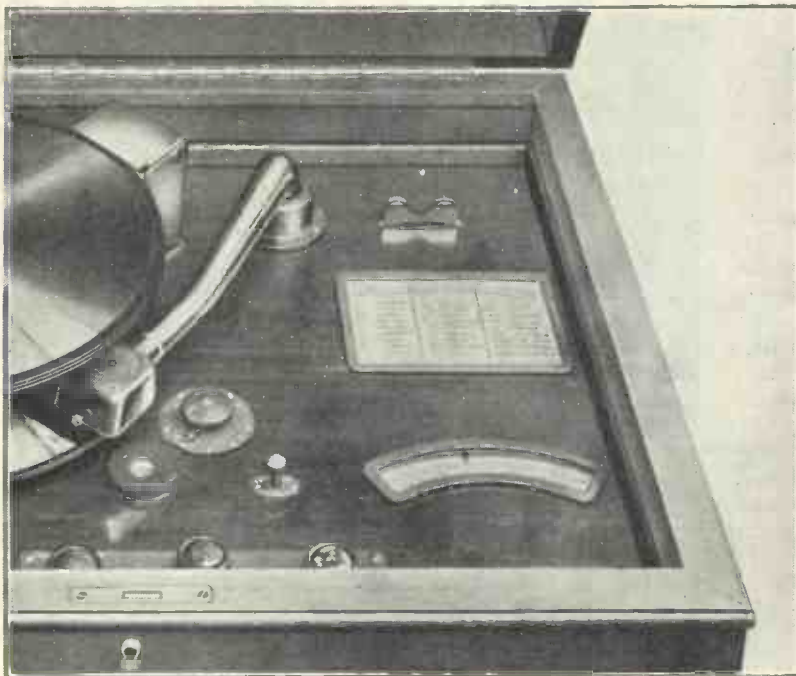
**£3.15.0**

Sent on 10 days' free trial against cash.

NOTE. This Convertor is suitable only for battery operated sets.



# AMATEUR AND MANUFACTURER—Cont. from page 116



**A TUNING SCALE THAT IS VERY EASY TO READ**

*The whole scale is visible and the pointer moves along as the tuning knob is adjusted. This is the type of control fitted to H.M.V. sets*

perhaps by next season we could be supplied with improved tuning controls.

When we come to the problem of wavelength-calibrated tuning scales we are obviously up against it; for unless the condenser-dial manufacturer knows which particular condenser and coil is to be associated with the dial he cannot begin to division the scale in wavelengths.

This leads me to the reflection that it would not be a bad idea for some enterprising manufacturer to produce a calibrated tuning unit—comprising a screening box housing one or two coils, a single or gang condenser, and a wavelength-calibrated dial.

### What Could Be Done

With such a component the constructor could make up a set that would equal the factory product so far as tuning were concerned. But it would have to be an inexpensive unit. What hopes?

Turning from constructional to circuit differences between the amateur and factory sets, I think there is a good deal the amateur might learn in A.C.-mains technique, but against this the amateur seems to be ahead of the manufacturer in battery-operated sets.

As the interest in mains sets is limited among amateurs there is not much point in giving mains-working details of the many points of circuit technique found in factory-built sets. Mostly, these relate to decoupling, which is much more extensively practised by the manu-

facturer than by the average amateur.

Restricted space and lengthy grid leads, especially in mains sets, are often the reasons for so much decoupling in factory sets. The amateur with a battery-operated set with well-spaced components and short grid leads need not, therefore, assume that he is missing any considerable efficiency.

In the basic couplings the amateur and set manufacturer are mostly agreed. That is to say for high-frequency amplification the coupling most favoured in both types of set is tuned grid or tuned anode, with a preponderance of the former among the factory products.

### Ganged Circuits

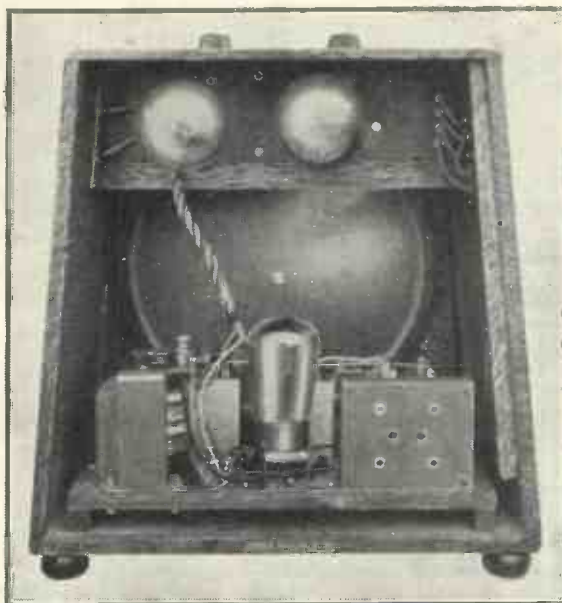
The liking for tuned-grid coupling may, I think, be traced to the fact that in commercial sets all the tuned circuits are ganged, and it is usually easier to gang a tuned-grid circuit to an aerial tuning circuit than a tuned-anode circuit.

For low-frequency coupling, many manufacturers stick to the straightforward transformer connections, with the usual primary decoupling. Some makers have adopted resistance feed, sometimes known as parallel feed, whereby the direct current of the anode supply is diverted from the primary winding of the transformer, so that the

nickel-alloy-core type can be used without loss of inductance.

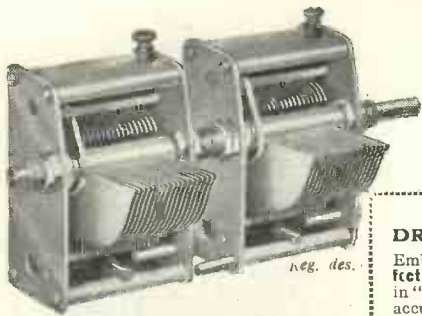
I note that one maker using resistance feed for the low-frequency transformer has decoupled the system. This would seem to be an advantage with mains-operated sets, but of doubtful value in a battery set.

One of the most remarkable points about the latest factory sets is the widespread neglect of band-pass tuning for the aerial circuit. Here the amateur has little to learn from the manufacturer, for even when  
(Cont. on page 120)



**A SET WITH BUILT-IN LOUD-SPEAKER**

*The Kolster Brandes A.C. Pup receiver is a good example of a commercial self-contained design complete except for aerial and earth*



**for Modern Circuits**

**"Astra" Screened Ganged Condensers**

Designed to meet efficiently all the requirements of modern circuits in which ganged condensers of reliable design and construction are essential. Accurate Matching is assured. Patented Method of Trimming allows extremely accurate adjustments. All brass throughout. Smooth action.

2-Gang      3-Gang      4-Gang  
**15/-    22/6    30/-**

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**"ASTRA" DRUM DRIVES**

Embody the same perfect Geared Movement as in "Astra" Dials. Silent, accurate control. Clear scale 0-100. Pilot Lamp Socket. Artistic bakelite escutcheon.  
**DRUM DRIVE 6/9**

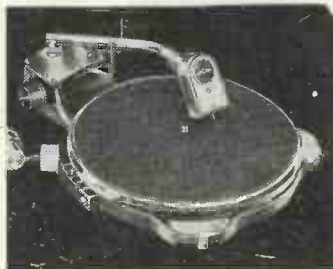


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*A Technical Revolution*

A Super-electric Turntable. One Unit only, for A.C. or D.C. Mains of all voltages little deeper than an ordinary turntable—will transform any wireless set into a radio-gramophone. Complete with sensitive pick-up, volume control, accurate tracking arm automatic start and stop, rubber feet and lead. No gears—cannot overheat or burn out—no oiling—constant speed. Complete ready for use.

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**Amateur Wireless HANDBOOKS**

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Loud-speaker Crystal Sets.

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**Quality Radio for £6.6.0**

**SEVEN VITAL FEATURES**

- Self-Contained Loud Speaker ● Band-Pass Tuning and Pentode Output giving Astonishing Selectivity and Power ● Economical Battery Consumption ● Full Broadcast Range (230-550 & 1,000-2,000 metres) and Easy Operation ● Entirely New and Simple Colour-Coded Assembly without Soldering ● Fixed Pick-up Sockets ● Compact Walnut Cabinet ●

At its amazing low price the Zonophone Kit Set brings Quality Radio within the reach of the most modest purse. The simple and ingenious construction of this set is praised by expert and amateur alike.



**GRAMOPHONE ENTHUSIASTS!**

The Zonophone Pick-up is the finest value in the world at

**15/-**

**AND OF COURSE ZONOPHONE BATTERIES**

Highest Efficiency  
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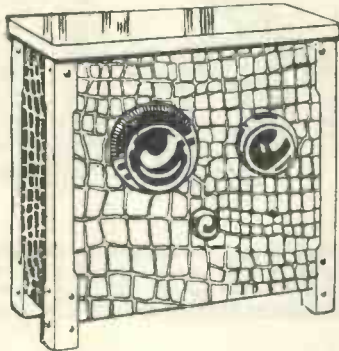
**ZONOPHONE KIT SET**

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There is no need to be tied down to a few stations—just put the Ealex Short Wave Convertor in front of your set—no alteration necessary. You can then tune in stations on the 16-60 metre band. Additional coil for the 140-90 metre band 5/- extra. All-mains model 65/- complete, plus additional coil 5/-.

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**60%**  
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- ① Ealex Frame Aerial. The best value obtainable for 20/-.
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## AMATEUR AND MANUFACTURER—Cont. from page 118

hand-pass tuning is employed commercially it is usually only a simple capacity coupling, which has not the advantage of the constant band width associated with the band-pass coils available to the home constructor.

I have harped a lot on the mains aspect of the factory-built set, but it must not be forgotten that some good work has been done in cutting down the running expense of the most convenient type of battery-operated set—the portable.

### Pentodes for Output

Two of the leading makes utilise pentodes for the output valve, and as these are of the latest economical type the total anode current drawn from the self-contained 100-volt battery is not more than 7 milliamperes, which means several months useful service before renewal of the battery is called for.

The amateur might learn something about economy of running from these portables, which apply only as much high tension to the intermediate valves as is required to give sensitive results.

The conclusion one must inevitably arrive at after comparing the modern factory-built set with the latest amateur sets is that there is little the amateur can usefully learn from the manufacturer, because the means of achieving the desired results are so radically different.

The most outstanding point of superiority of the factory set is its operation. In that one respect the



**PENTODES FOR ECONOMY**

Many manufacturers use pentodes to save battery consumption and yet get good volume. This photograph shows a Cossor battery pentode

amateur really has a lot to learn—and so, indeed, has the component manufacturer.

## “The Super-het Adaptor”

LAST month in a special supplement we gave details of a super-het adaptor by means of which any standard receiver with high-frequency amplification could be turned into a short-wave super-het, the high-frequency valves being used as intermediate-frequency amplifiers.

In the list of components, given on Page Eight of the supplement, the short-wave coils were wrongly described as an Eddystone short-wave inductance unit, price £1 2s. 6d.

The coils actually used in the unit were the Eddystone duplex short wave coil set, price 19s.

### Wavelength Ranges

A wavelength range from 14 to 100 metres is covered by the coil set, but additional coils can be obtained to cover other ranges.

Those who require the very short-waves should note that an additional coil, type D1, price 5s., will cover a wavelength of 10 to 17 metres.

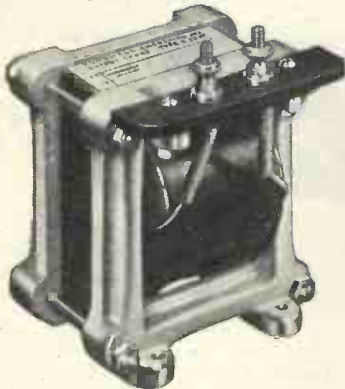




# For Quality of Reproduction

# Design Data Sheets

By J. H. Reyner,  
B. Sc., A.M.I.E.E.



Tunewell Choke S20/25 Price 12/6

## TUNEWELL CHOKE SPECIFIED for the 1932 SUPER 60 for A.C. Mains

described in this issue.

1 Tunewell Choke S20/25 12/5

Tunewell go on from success to success. Tunewell coils and components are well known for their remarkable efficiency, and now the new Tunewell Mains Components are getting the recognition their performance deserves.

For any set, include Tunewell Components, and you will be certain of super results.

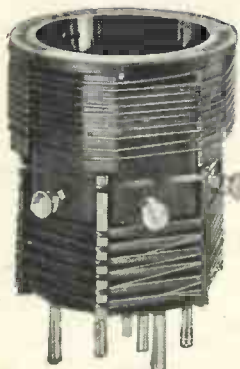
Choke S20/25. Inductance 20H up to 50 m/A. ... 12/5

Transformer MV/50. Output 250 v. at 60 m/A, 4 v. at 4 amp., 4 v. at 2 amp., 4 v. at 1 amp. ... £1 15s.

Choke S2/103. Inductance 20H at 100 m/A. D.C. resistance 325 ohms.

Price ... 18/6  
Eliminator, type FV150/30. Output 150 volts at 30 m/A., 4 tappings (2 variable) ... £5

## TUNEWELL Dual Range ULTRA-SELECTIVE Coil



The Coil that is SPECIFIED for the

TRANSPORTABLE THREE

described in this issue.

For Panel Mounting complete with switch 10/6. Windings as illustration, but wound on latest type hollow panel mounting or base fitting former.

★ Lists are being prepared for the new range of Tunewell Components

at greatly reduced prices. Send your application now for a copy, also for details of the remarkable Tunewell All-Mains Three Receiver, which will be ready soon.

TURNER & CO., 54 Station Road  
New Southgate, London, N.11

### "W.M." Design Data

No. 37

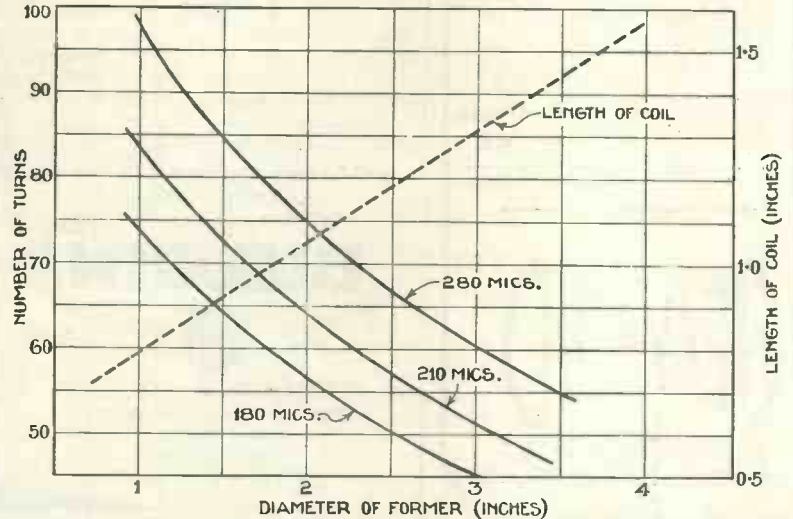
## COILS, BEST SHAPE OF

THERE is a best shape for any coil and the curve reproduced herewith gives the approximate requirements for single-layer windings, suitable for tuning over the medium waveband (250 to 550 metres).

First decide the diameter of former to be used. Next determine the correct number of turns required. Three values

of inductance are shown, namely 180, 210 and 280 microhenries respectively, intended for tuning with .0005-, .0004-, and .0003-microfarad condensers.

Next determine the winding length (dotted curve) for the particular diameter of former. Reference to wire tables will then show what gauge of wire and what coupling is necessary.



### "W.M." Design Data

No. 38

## COUPLING CONDENSER, SIZE OF

FOR resistance or choke coupling the coupling condenser and grid leak are connected by a simple relationship, if good quality is to be obtained. The speech voltages are developed across the anode circuit and are handed on to the next valve through the coupling condenser. The impedance of the coupling condenser must be negligible if there is to be no loss.

An examination of the circuit shows that the voltage is really applied across the coupling condenser and grid leak in series and it is the voltage across the grid leak which is actually applied to the valve. Hence, provided the resistance of the grid leak is large compared with the impedance of the coupling condenser, practically all the voltage will be applied across the valve.

The condenser impedance is, of course, a variable quantity, being very small at high frequencies and becoming increasingly large as the frequency is reduced. Sooner or later the impedance

becomes so large that the above condition is not complied with and some of the signal is lost on the condenser.

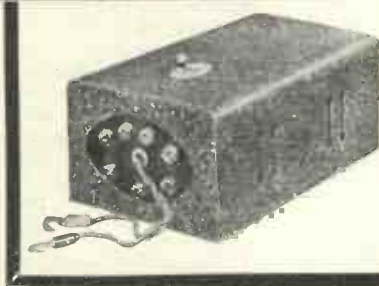
By suitable choice of coupling condenser and leak we can arrange that the condenser impedance is less than 10 per cent. of the grid-leak resistance down to any frequency we choose. Below this point there is a gradually increasing cut-off action.

The table herewith shows the appropriate values for cut-off frequencies of 50, 100, and 150 cycles per second :-

| Cut-off Frequency   | 50                              | 100   | 150   |
|---------------------|---------------------------------|-------|-------|
| Grid Leak (megohms) | Coupling Condenser (microfarad) |       |       |
| 0.25                | .025                            | .013  | .008  |
| 0.5                 | .073                            | .006  | .004  |
| 1.0                 | .006                            | .003  | .002  |
| 2.0                 | .003                            | .0015 | .001  |
| 3.0                 | .002                            | .001  | .0007 |

(Continued on page 124)

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**"Transportable Three"**  
**COMPLETELY ELECTRIC**  
**MAINS UNIT**  
**FOR** **9/2**  
 and 11 payments of 8/8 or  
**CASH PRICE £4:15:0**



**TYPE G.B.1**  
**H.T.** 150 v. at 15 m/a. or 120 v. at 20 m/a. Also S.G. and Det. Tappings.  
**G.B.** 3 Tappings up to 12 v. Independent of H.T.  
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 Similar to above but larger output.  
**—TYPE G.B.3**

TANNOY mains units incorporate independent G.B. Pat. No. 353375.

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**PERMANENT**  
**MAGNET**  
**Moving-coil**  
**Speakers**

★ Eighteen months before the many so-called pioneer claims to the production of the Permanent Magnet Moving-coil Speakers, Epoch designed, developed and manufactured the first practical Permanent Magnet. Epoch's leadership in this class is definitely established by a new standard of comparison for quality and price set by Model 99K and Model A.2

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**Pioneers**

**Years Ahead In**  
**Research and Design**



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**99K**  
 (De-Luxe)

A new Model Permanent Magnet Moving-Coil Speaker designed for quality only. Given a fair amplifier, the reproduction is as perfect as is possible at the present time, and is much in advance of most moving-coil speakers, permanent magnet or energised.

99K Unit with Inter-changeable diaphragm **£6-2-0**  
 Or 11 monthly payments of 12/2

With 9 Ratio Transformer ready to connect to practically any set **£7-7-0**  
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**A NEW MODEL**

**A.2** Giving better quality, greater volume and more sensitive than our earlier A.2 model. A better instrument in every respect at the same price!

Complete with 3 ratio input transformer **£3-3-0**  
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At the Junction of Rosebery Ave. & Farringdon Rd.

**INDIVIDUALITY**  
 We do not manufacture indiscriminately every component and accessory known to radio: we produce rotary switches and anti-microphonic valve-holders which are quite definitely the finest in the world. For your own good you should incorporate Benjamin components in your set.  
 By the way, have you had our 1932 Catalogue with its three original circuits? If not write now—right now!

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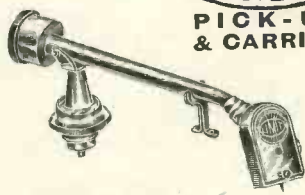
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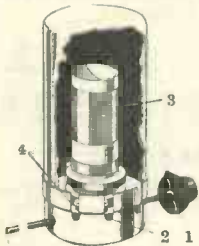
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These coils may be adapted to nearly any circuit and if you have any difficulty just send us your circuit and we will advise you.

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This range of coils has been specially developed in view of modern broadcasting conditions. A high degree of selectivity is assured by using these coils as they are specially screened to prevent direct pick-up or interaction between the various units.



**Type S.A.1.—** Screened aerial tuner with aperiodic aerial tapping for high selectivity. This tuner can be adapted for any type of receiver. Price—

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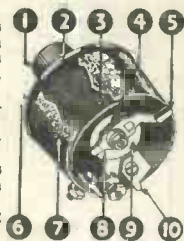
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1. Wave-change switch.
2. All contacts are gold silver alloy which does not oxidise, therefore resulting in perfect low-resistance contacts and reliable switching.
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- Any resistance up to 50,000 ohms standard wiring, Square Law 6/6



**5/6**

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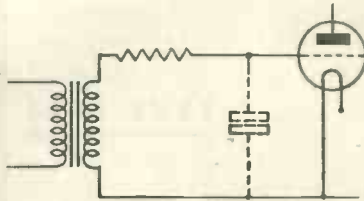
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**WATMEL WIRELESS CO., LTD.,**  
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## DESIGN DATA SHEETS—Cont. from page 122

"W.M." Design Data

No. 39

### GRID STOPPERS



High resistance in grid circuit

**A**N insertion of a high resistance in the grid lead of a low-frequency valve, as shown in the diagram, is often resorted to in order to cut off frequencies in excess of a certain value.

The operation of the device depends upon the fact that the voltage developed by the secondary of the transformer (or otherwise applied to the circuit) is divided between the series resistance or grid stopper, as it is called, and the capacity between grid and filament of the valve.

At low frequencies the impedance of the valve capacity, which is of the order of 50 micromicrofarads, is very high so that a series resistance of 100,000 ohms or so will have a negligible effect, practically all the voltage being developed across the valve.

As the frequency increases the impe-

dance of the valve capacity tends to decrease and at radio frequencies it presents quite a small impedance by comparison with the series resistance. Most of the voltage, therefore, is wasted across the resistance and only a small proportion applied to the valve.

Such an arrangement thus has the action that it passes low frequencies unimpaired, but only allows a small fraction of the applied voltage to reach the valve in the case of radio frequencies. This is, therefore, useful for preventing radio-frequency currents from circulating in the audio-frequency stages where they are liable to produce distortion.

They are also useful for preventing parasitic oscillations of inaudible frequency, the value of the stopper resistance usually being chosen so that cut-off action begins to be effective at about 5,000 cycles. A resistance of 100,000 ohms is sufficient.

If only radio-frequency currents are to be guarded against, a still smaller resistance is effective, but this may not give very good protection against an inaudible low-frequency oscillation. If the resistance is made larger than 100,000 ohms there is a danger that the upper-note frequencies may be cut off.

"W.M." Design Data

No. 40

### FREQUENCY AND WAVELENGTH

**M**UCH of radio practice deals with resonance, principally at radio frequencies and often at low frequencies. When the capacity and inductance are connected by a certain relationship the current in the circuit rises many times above its normal value and this property is used for tuning.

The frequency at which resonance occurs is given by the expression :

$$f = \frac{159}{\sqrt{LC}} \text{ cycles per second}$$

where L = inductance in henries,  
C = capacity in microfarads.

When the inductances and the capacities are made small the frequency of the resulting current is very high and electromagnetic radiation takes place. Radio transmission is based on this radiation, and it has become the practice to refer to the wavelength of the electromagnetic waves rather than the frequency of the currents generating them. The two aspects are related by the expression :

Frequency × wavelength = 300,000 where the wavelength is in metres and the frequency is in kilocycles.

Based on this expression it is possible to determine the relationship required between inductance and capacity in order to tune a set to a given wavelength. Since radio parlance uses wavelength to a considerable extent this form of expression is often more convenient. The quantities are connected by the relation :

$$\text{Wavelength} = 1,885 \sqrt{LC}$$

where L = inductance in microhenries  
C = capacity in microfarads.

It is clear that for any given frequency or wavelength there is a large number of possible combinations of inductance and capacity, the essential requirement being that the product of the two shall remain the same. Thus, if a .0005-microfarad condenser requires a 200-microhenry inductance to tune to 600 metres, a 400-microhenry inductance would require a .00025-microfarad condenser, and so on.

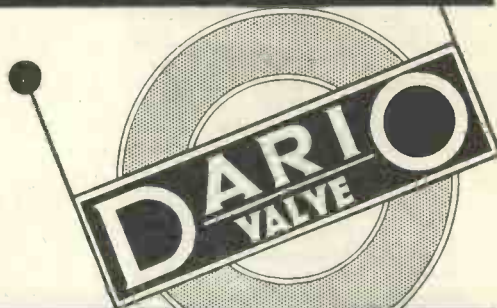
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# BUILD YOUR SET FROM A "W.M." BLUEPRINT!

A blueprint of any one set described in the current issue of "Wireless Magazine" can be obtained for half price up to the date indicated on the coupon (which is to be found on the last page) if this is sent when application is made. These blueprints are marked with an asterisk (\*) in this list and are printed in bold type. An extension of time is made in the case of overseas readers.

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| "B.B.C." Crystal Set | AW281 |

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| Regional Ultra-selective One | AW278 |
| "B.B.C." One                 | AW280 |
| Easy-to-Build One            | AW304 |

## TWO-VALVE SETS

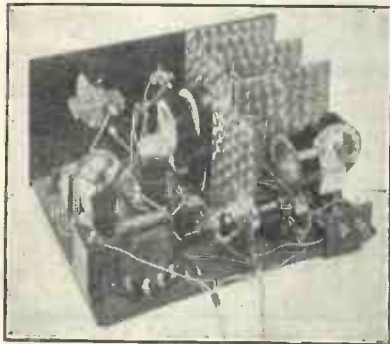
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| Aladdin Two (D, Trans)             | WM231 |
| Ever-tuned Regional Two (D, Trans) | WM241 |
| Station-finder Two (D, Trans)      | WM243 |
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| New Economy Two (D, Trans)         | WM265 |
| B.B.C. Selective Two (D, Trans)    | AW292 |
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| Regional Three (SG, D, Trans)                    | WM236 |
| Gramo-radio AC Three (SG, D, Trans)              | WM237 |
| Band-pass Inceptordyne (SG, D, Pen.)             | WM244 |
| Ether Marshal (SG, D, Trans)                     | WM247 |
| Five-Advantage Three (D, RC, Trans)              | WM257 |
| Everybody's Radiogram (SG, D, Trans)             | WM258 |
| Meridian Short-waver (D, RC, Trans)              | WM255 |
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| New Economy Three (SG, D, Trans)                 | WM263 |



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|   |       |
|---|-------|
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| ★ Transportable Three (SG, D, Trans)          | WM271 |
| Ultra-selective Straight Three                | AW282 |
| 1931 Ether Searcher (D.C. model)              | AW284 |
| Mains Section                                 | AW285 |
| Square-peak Three (SG, D, Trans)              | AW293 |
| 1931 Britain's Favourite Three (D, RC, Trans) | AW299 |
| Universal Short-wave Three (SG, D, Trans)     | AW301 |
| Olympian Three (SG, D, Trans)                 | AW306 |
| Tonality Three (D, RC, Trans)                 | AW321 |
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| The Orchestra Four (D, RC, Push-pull)        | AW167  |
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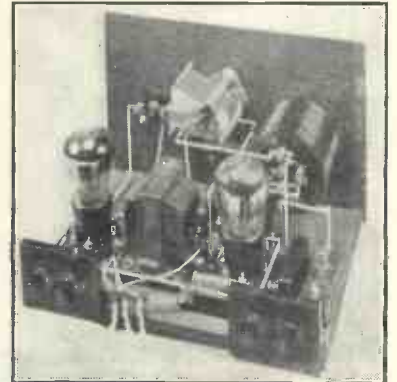
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Note that not more than two questions may be asked at a time and that queries should be written on one side of the paper only.

Under no circumstances can questions be answered personally or by telephone. All inquiries must be made by letter so that every reader gets exactly the same treatment.

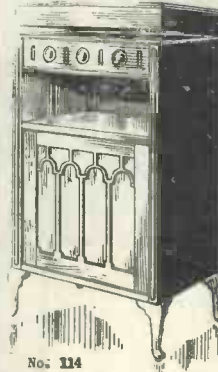
Alterations to blueprints or special designs cannot be undertaken; nor can readers' sets or components be tested.

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OF THE DATE

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