WIRELESS CONTROL :: SET BUYER'S GUIDE

Wireless Magazine

1/- Monthly

Edited by Bernard E. Jones VOL. 4, NO. 21. *October, 1926*

The 1927 Five— a year ahead of any other receiver!

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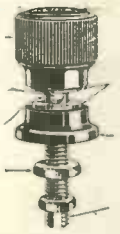

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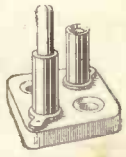

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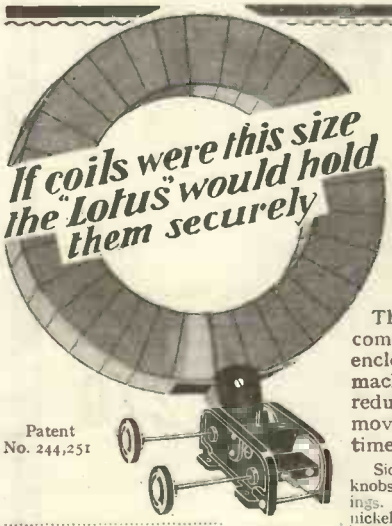

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Wireless Magazine

for October, 1926

Vol. IV No. 21

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A "Press-the-Button" Set for the Young Listener

HOME-CONSTRUCTOR SETS IN THIS ISSUE.

Announcements.—*The* WIRELESS MAGAZINE, *edited by Bernard E. Jones, is published about the 25th day of the month, and bears the date of the month following. Technical Adviser: Sydney Brydon, D.Sc., M.I.E.E. One Shilling Net. Subscription rates are 15s. 6d. a year, post free; Canada, 13s. 6d. a year, post free. Contributions, accompanied by stamped and addressed envelopes, are invited. All editorial communications should be addressed to The Editor,* WIRELESS MAGAZINE, *La Belle Sauvage, London, E.C.4. Subscriptions should be addressed to The Publisher,* WIRELESS MAGAZINE.

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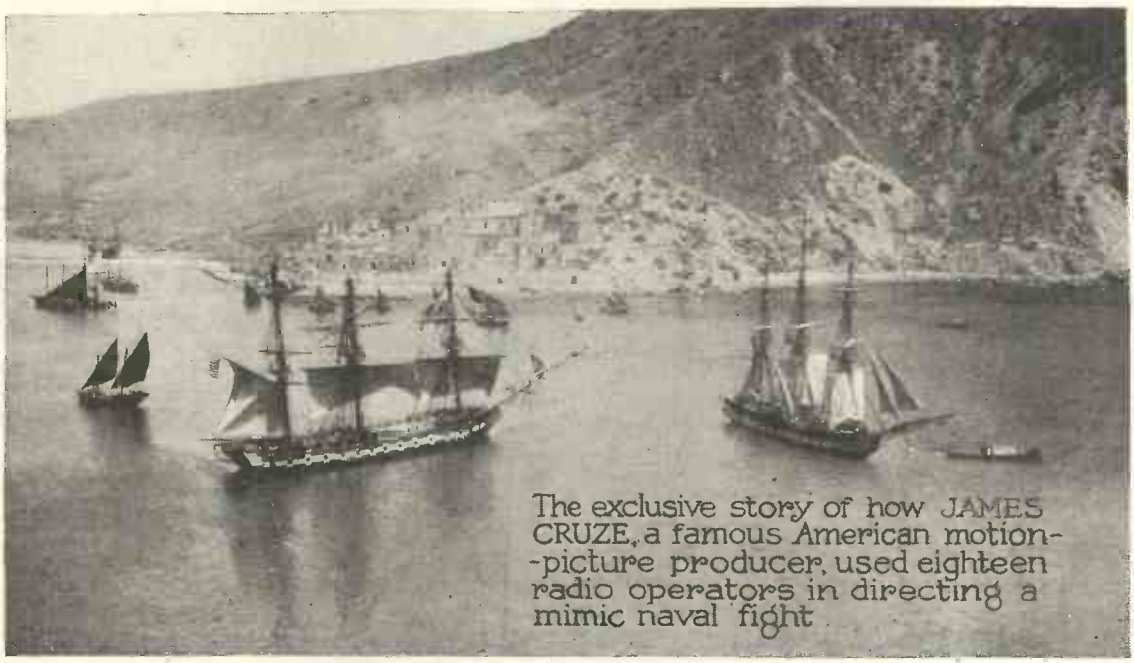
By LLOYD JACQUET.

Directing A Film Battle by Wireless!



The exclusive story of how JAMES CRUZE, a famous American motion-picture producer, used eighteen radio operators in directing a mimic naval fight

Some of the ships which James Cruze directed by wireless in the filming of the Paramount picture "Old Ironsides." [Paramount

THE grim music of war—crisp firing commands; orders to board enemy vessels; boom of cannons—will be the incongruous but novel radio programme which amateur stations in Hawaii, Northern Canada, and even Great Britain, may pick up one of these fine mornings if they happen to be listening-in on about 110 metres.

No "Breaking Away"

Nor will this unusual programme be the extravagant effort of some station director to break away from the monotony of the usual concert that makes up the "diet" of the average broadcasting station. It will be a real war to which the listeners will be eavesdropping.

This little private war is being enacted off the coast of California; nothing could be more realistic than the shouts of the sailors as their crafts grapple, and the sound of their chiefs' oaths and commands.

One or two words briefly spoken may give the secret away, however. For as soon as you hear "Action," "Camera!" you will know that this miniature sea battle is for the make-believe world of the motion picture.

Those words, from the director, give the cue: you are probably listening-in to the first filming of a photoplay directed by means of radio. The director, James Cruze, has chosen this only method of handling 1,500 actors, on thirty small ships, all in action over an area of some twenty square miles.

He has dropped the traditional megaphone and the microphone carries to the principals of the cast his directions, as he follows the action with the script of the scenario from some convenient point.

The photoplay in the making is one of an historical type. It portrays the American victory over the Tripolitan pirates in 1804. The problem, specifically, was to find some convenient, efficient, and reliable way to handle the small fleet of ships which were to be used as the "pirates" and American ships in the battle. Radio was the only means whereby this could be satisfactorily accomplished.

A system of broadcasting was accordingly developed and built by the electrical department of the studio filming the picture. A small radio-telephone station, with sufficient power to be heard over the operating zone, and yet not too powerful because of possible interference with local shipping, was built and tested. It consisted of a 15-watt outfit, the whole built into a case which made it easily portable.

Batteries for Power Supply

As the thought of motor-generating units on the field of action is very unpractical, batteries were used to supply both the filament and plate currents. Sufficient high-tension bat-

teries of the dry-cell type were connected together to secure at least 500 volts potential for the transmitting valves' plates.

There was nothing unusual about the design of the transmitter, which was of the inductively-coupled Hartley-circuit type. Its portability and reliability were its two great qualities.

This radio-telephone transmitter was to accompany the director on "location." When he desired to watch and direct part of the picture from the side of a hill, overlooking the Catalina Isthmus, the apparatus was brought there for him. If close action was to be filmed, the set was removed to the camera-barge; and should the presence of the director be preferable near the Tripolitan fort, the sending station was near him. A short aerial and counterpoise made up its radiating system, and worked well with a minimum of trouble.

Short-wave Receivers

For the different units to hear the orders and directions of the director, small short-wave receiving sets were built, and installed in the ships, on the docks, tug-boats, offices, fort, and other strategical points, so that the entire "lot" was covered.

The installation of the receivers on board the ships was a difficult matter, for small space was available for the aerial. In some cases the wires were but six feet long, and in others they reached 30 feet. An operator was provided with each receiving station.

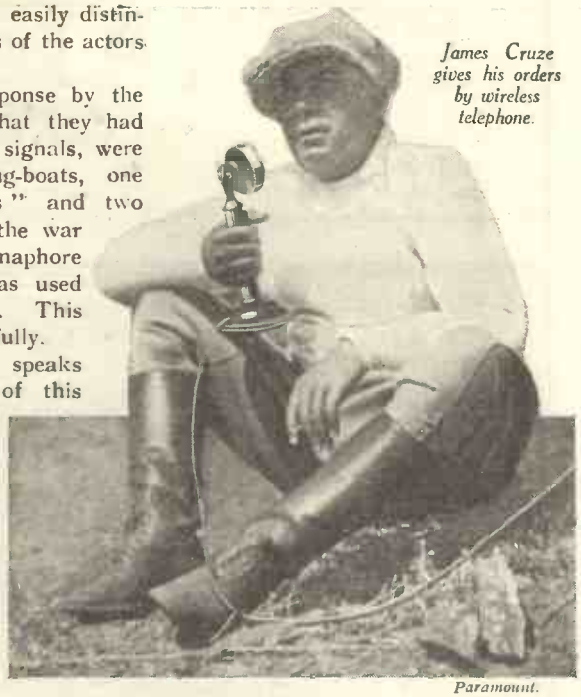
These small short-wave sets were of conventional design. They consisted of a modified Reinartz circuit, employing a regenerative detector and two stages of low-frequency amplification. With phones the voice of the director could be easily distinguished above the noises of the actors and cannons.

Two methods of response by the receivers, to indicate that they had properly understood the signals, were in effect. On the tug-boats, one whistle indicated "yes" and two whistles "no." On the war vessels and docks, semaphore flags were displayed, as used in the military service. This answered the purpose fully.

When James Cruze speaks into the microphone of this miniature broadcasting station, he is heard within a radius of probably thirty or forty miles. This takes in everything even remotely connected with the business of taking the picture, such as the general offices of the studio, located some distance inland.

Though the range is positive at this radius, there is no question but that the short waves from Cruze's transmitter are reaching out to the four points of the world, telling it in detail of what he is doing there off the Catalina coast.

As soon as Cruze gives the word you could see, if you had television, the warships square off to strike a broadside, or go for one another as to grapple. You would see the guns in the old Tripolitan fort fire, and those of the attacking frigates and gunboats answer promptly. Sailors would spring over rails with cutlasses between their teeth on the command from the mountain side. Then you would see smaller corsairs enter into action, the attack upon the *Constitution*, and the desperate firing of guns as ships manœuvred for position.



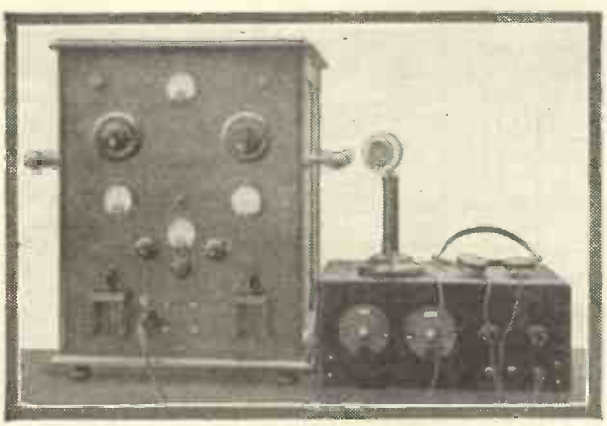
James Cruze gives his orders by wireless telephone.

Paramount.

All that you can follow with Cruze as he directs the picture. It thrills you with realism, and yet the scene is supposed to have been enacted over one hundred years ago off the coast of Africa!

Life-saving!

It is curious that here again, while in a purely industrial use, radio again succeeded in its earliest mission—that of life-saving. At one time or other the broadcasting station and its receiving system saved every one of the thirty ships, with a single exception, from being dashed on the rocks in the battle action that occurs in a small harbour off the island.



Paramount.

KFP is the call-sign of this transmitter used by James Cruze.

Paramount.

One of the eighteen licensed-operators tuning-in a short wave receiver.

Directing a Film Battle by Wireless *(Continued)*

With so many ships in action in a small space, the possibilities of perfect navigation, even with the wind disregarded, is a difficult thing.

The American gunboat was one of the craft which was saved from destruction by radio. She was seen drifting towards a rocky section of the shore, her sails flapping and rather helpless. The danger was seen from the shore and a radio call sent one of the nearest tugboats to her rescue. Lines were made fast, and she was swung out of danger with but a few feet to spare.

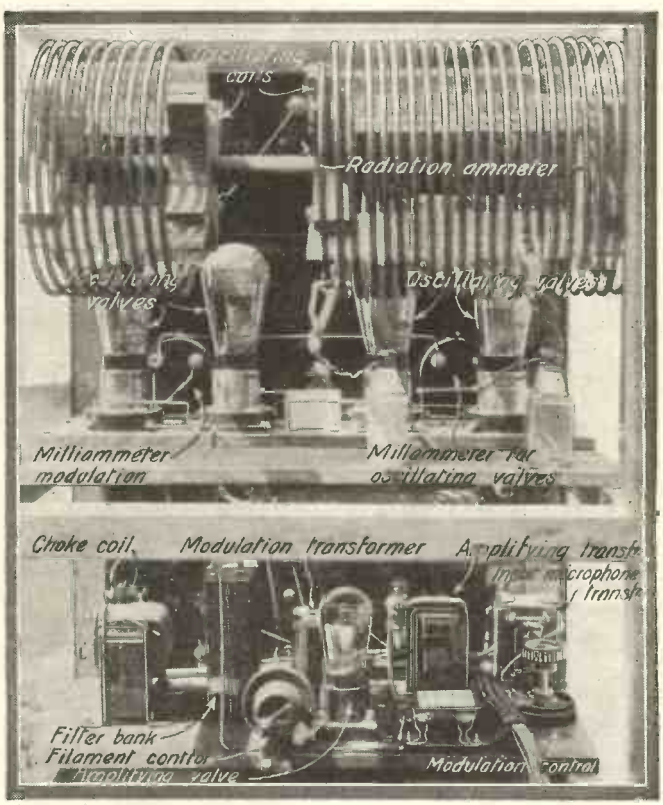
A small corsair was not so fortunate. It was dashed to pieces on the giant boulder which is at the base of the Tripolitan fort. However, sixteen men were taken off her uninjured by a tugboat that was sent out after the battle. This little incident provided real material for the photoplay.

When the topmasts of the U.S.S. *Constitution* were splintered off in a heavy sea—the same day that Duke Kahanamoku, the famous Hawaiian swimmer, saved two sailors who had been thrown in the water from the tangled rigging—emergency orders were broadcast to the crew by radio. These were promptly obeyed and confusion as well as danger reduced to a minimum.

At the same time, those signals were picked up by the studio station, and the naval architect, as well as the scenarist, were both on the scene by the time the ship was towed back to port. They had come over by seaplane and started at once to repair the damage so that the picture could be continued.

This latest use of radio is one that will be of interest to every radio fan. Let us hope that all motion-picture producers will adopt this method of directing their newest pictures. Then when we see the play in a theatre we shall enjoy its scenes all the more, for having *heard* them filmed!

LLOYD JACQUET.



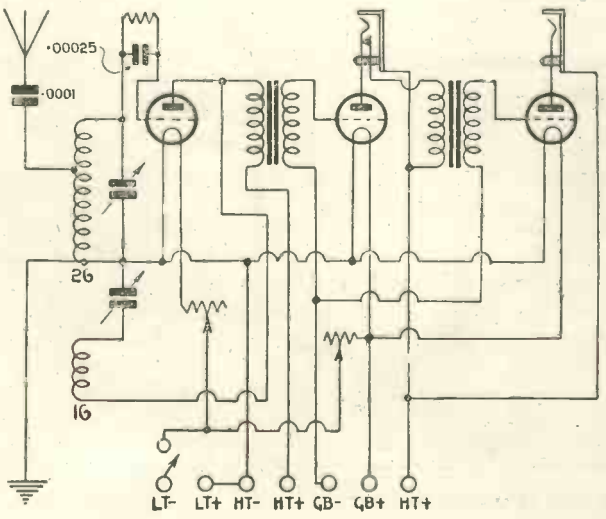
Rear view of Transmitter used in Radio Direction of Battle Scenes.

Wireless-controlled Beacon Stations.

An official notice to mariners announces that an unattended fog signal controlled by wireless has been permanently established on Rosneath Beacon in the Firth of Clyde. The installation was put in for experimental purposes in January of this year, and the trials since carried out under actual working conditions have been so successful that the station has now been made permanent.

The use of wireless in this way makes it possible to erect unattended lighthouses and fog signals at many difficult situations or dangerous rocks where it is at present too expensive to provide keepers, or where it is impracticable on account of rocky bottom, strong tides, or rough seas to maintain a cable.

B. A. R.

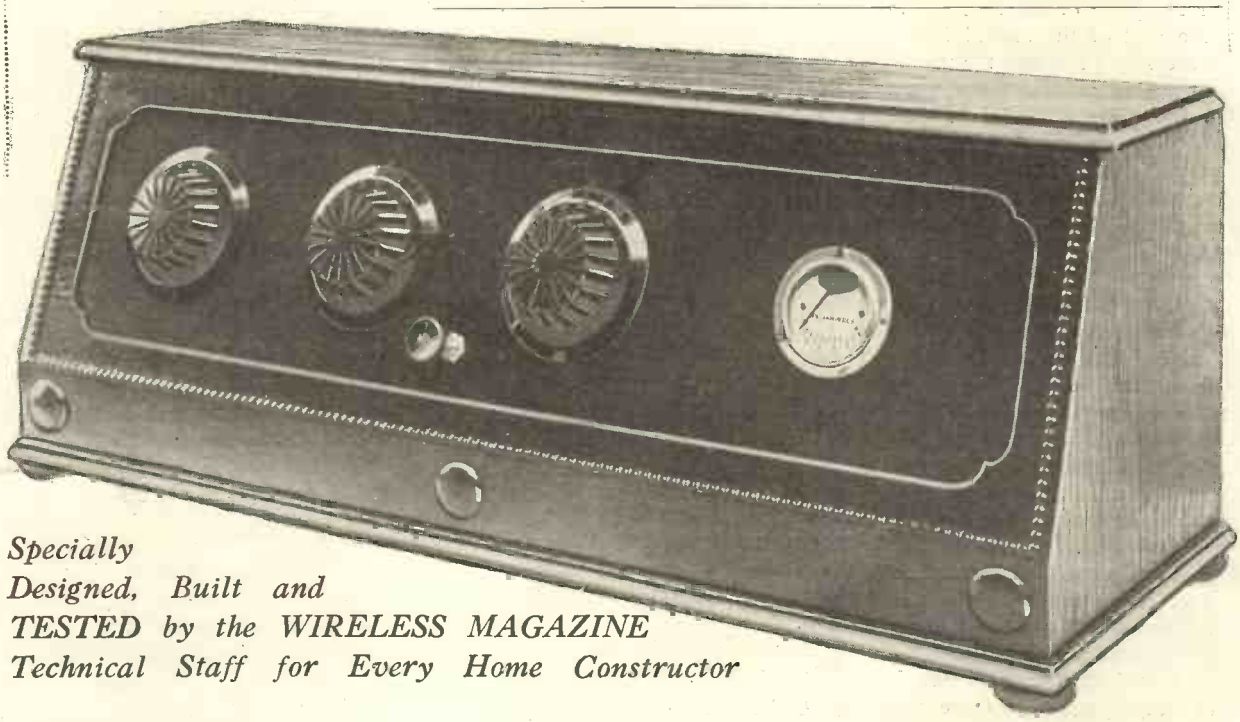


Circuit Diagram of Receiving Set used in Picking-up orders off Catalina Island.

Nothing Can Compare with

The 1927 Five—

A Year Ahead of Any Other Receiver



Specially Designed, Built and TESTED by the WIRELESS MAGAZINE Technical Staff for Every Home Constructor

EFFICIENCY is the keynote of the 1927 Five—efficiency in the circuit used, in the choice of components, in the shielding, and in the layout and wiring. Moreover, while efficiency has not been sacrificed to obtain ease of control, the operation of the set is very simple indeed.

Secret of Success

The secret of the success of the 1927 Five lies partly in the special high-frequency portion of the receiver, in that *no means of stabilising the circuit by introducing losses of any sort* are used.

But chiefly the high efficiency is obtained by the method of coupling the two H.F. valves, a method which involves a simple application of the well-known Wheatstone-bridge principle.

The four arms of the "bridge" (shown in the accompanying sketch) are made up by the inductances B and C, and by the capacitances CGP and NC. The internal capacity of the valve is represented by CGP and that of the neutralising condenser by NC, the latter, of course, being adjustable.

Hence we have in the arms of the bridge three "knowns," consisting of the two coils and neutralising condenser, and the "unknown," represented by CGP.

Excellent results have been obtained with this set—see the table on page 195.

By adjusting the "known" NC to a suitable value the whole circuit may be brought into a state of delicate but perfect balance.

With the slightest variation in the impedance of CGP, caused by an incoming signal, the delicate balance will be upset and an amplified form of the disturbance will be present between the coil A and the variable tuning condenser TC.

It is impossible, once the balance of the circuit has been struck, to feed back energy from the plate to the grid of the valve. Self-oscillation is therefore eliminated, and it is possible to use components of the highest efficiency without the fear of instability.

Turning our attention to the circuit diagram we see that two tappings are provided on the grid coil of the first H.F. valve.

Selective Aerial Coupling

In effect, this method of aerial coupling is similar to two distinct coupled coils, the aerial coil being semi-aperiodic. Actually, the aerial semi-aperiodic portion of the coil is included between either of the two tappings, and the earth connection.

It will be found in practice that the lower tapping, giving an aerial coil

The 1927 Five *(Continued)*

of ten turns, is more selective and should be used for the wavelength band between 250 and 350 metres, the higher tapping being used for higher wavelengths between 350 and 600 metres.

In the plate circuits of both the H.F. valves the special balanced coupling is used. Connections between the plate of the first H.F. and the grid of the second H.F. valve are taken through the usual small blocking condenser that prevents the plate potential of the valves being applied to the grids. A similar connection exists between the second H.F. and detector valves.

Grid Leaks

To prevent the accumulation of a negative charge on the grids of the valves, high-resistance leaks are connected between the grids and the filaments.

The neutralising condenser of the first H.F. valve is mounted at the back of the panel on the baseboard, and when once adjusted may be left alone.

The second neutralising condenser, however, is mounted on the panel and affords an efficient and smooth control of reaction.

Two transformer-coupled low-frequency amplifying valves are used, provided with jacks so that the last stage may be cut out at will; by removing the plug altogether the filament circuits of all the valves are broken.

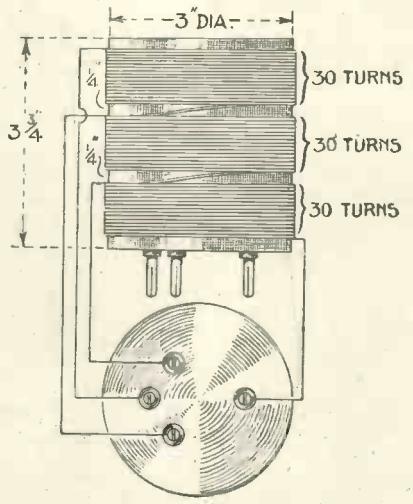
It will be noticed also that no variable filament rheostats are used, thereby cutting down the number of controls and giving the panel a clean and uncrowded appearance.

Fixed "Resistors"

In order that the filaments of the valves should not be over-run, fixed resistances are inserted, having a resistance value specially designed for the particular valves used.

These "resistors," as they are called, enable the correct voltage to be applied to the filament of each of the valves. When ordering these resistances, it is imperative that the type of valve with which they will be used is mentioned. They may be obtained in types suitable for most British valves.

To avoid unwanted regeneration and the resultant disturbing oscillations, and to enable each stage to be perfectly balanced, it is necessary to eliminate all coupling between the successive stages of H.F. amplification.



Details of Anode-coil Winding, showing under-side of coil.

This coupling is existent between adjacent H.F. coils and there are also capacity effects between the several coils and the aerial, all of which must be neutralised if efficient and stable operation is to be obtained.

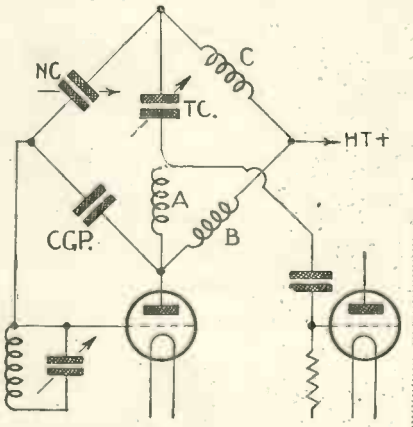


Diagram showing Application of Wheatstone-bridge Principle.

In addition to these couplings there are other incidental ones which must be eliminated to produce a successful receiver.

The only method of eliminating these undesired couplings is by the use of metal shields. Briefly, the advantages of shielding as applied to neutralised receivers are as follow:—

1. With shielding perfect neutralisation can be obtained.
2. Magnetic or capacity pick-up of interfering signals on intermediate circuits is eliminated.
3. By removing the effects of stray couplings any number of H.F. stages (within reason) may be employed.

Shielding and Damping

Complete shielding, however, seems to have a damping effect on the tuning, especially if the coils are close to and completely surrounded by the shield.

In the 1927 Five it has been found sufficient to place flat metal screens between each H.F. and the detector stages. A sketch showing the shape and dimensions of the four aluminium screens required is given.

With regard to the coils, the constructor may make these for himself or else they may be obtained complete with their mounting bases from the firm indicated in the list of components.

For the aerial coil a cylindrical ebonite former is required having a diameter of 3 in. and a length of $3\frac{1}{4}$ in. Into one end of the former a circular ebonite panel is fitted on which are mounted four plugs spaced in such a manner that the coil cannot be inserted the wrong way into the corresponding sockets mounted on an ebonite base.

Winding the Coil

On the former sixty turns of No. 20-gauge d.c.c. wire are wound, tappings being taken from the tenth and fifteenth turns. These tappings and the two ends of the coil are connected to the four plugs as indicated in the sketches. It is extremely important that these connections are made to the proper plugs.

Two identical H.F. anode coils are required, both wound on a cylindrical

WHAT YOU CAN DO WITH THE 1927 FIVE

(The Receiver that is a Year Ahead of any other)

Fifty Stations at Loud-speaker Strength!

All the stations mentioned in the following list were received at a distance of 7 miles from 2LO at loud-speaker strength. No station that is logged below was received for less than 10 minutes. Those stations marked with an asterisk (*) were heard on an indoor aerial about 20 feet in length.

IN ADDITION, ABOUT TEN HIGH-WAVELENGTH STATIONS!

Station.	Wave-length in Metres.	A.T.C. Read-ing.	First H.F.T.C. Reading.	Second H.F.T.C. Reading.	Station.	Wave-length in Metres.	A.T.C. Read-ing.	First H.F.T.C. Reading.	Second H.F.T.C. Reading.
*Kiel	233	82	99	98.5	*Oslo	382	32.5	47.5	46
*Stettin	241	81	95	88	*Bournemouth	387	32	46.5	45.5
Gleiwitz	251	78	93	86	*Hamburg	392	31.5	46	45
*Elberfeld	259	76	91	85	Madrid (Radio-Iberica)	392	31.5	46	45
Cassel	273	70.5	88	83	*Dublin	397	28.5	44	42.2
*Bremen	277	69	87	82	Bergen	400	28	43	42
Toulouse	280	68	86	81	*Newcastle	404	27.5	42.5	42.5
*Dortmund	283	66.5	85	78	Munster	410	26.5	41	41
Gôteborg	287	65	84	76	Bilbao	415	25.5	40	39.5
*Dresden	294	63	81	75	*Breslau	417	25.2	39.8	39
*Hanover	297	62	80	73	*Glasgow	422	24.4	39	39
Barcelona (EAJ18)	300	61	78	72	*Rome	425	24.5	39	39
Stoke	301	60.5	77.5	71.5	*Radio Toulouse	430	24	38.8	38.2
Sheffield	306	57	72	69.5	Stockholm	430	24	38.8	38.2
Milan	320	52.5	69	67	*Berne	435	22.5	36.5	36
Barcelona (EAJ1)	324	51.5	66.5	64	Belfast	440	21	34	34
Nottingham	326	51	66	63.5	*Stuttgart	447	20	33.5	33.5
Plymouth	338	46	61.2	58.5	Leipzig	452	19.5	32	32.5
Madrid (Radio-Castella)	340	45.5	60.5	58.2	École Supérieure	458	19.2	31.75	32
San Sebastian (EAJ8)	343	45	60	58	Radio Catalana	460	19	31.5	32
*Cardiff	352	41.5	56.5	57	Koenigsberg	462	18.5	31	31.5
Seville (EAJ5)	357	41	56	56.5	Frankfort	470	17	30.5	30.5
*London	365	37	51	50	*Birmingham	479	16.5	30	30
Madrid (U.R.)	373	35.5	49	49	Brussels	487	15.5	27	22
*Manchester	378	33	48.5	47.5	Munich	488	15.25	27	22
					Aberdeen	495	14	26.2	21

(Details of high-wavelength broadcasting stations will be given next month.)

The 1927 Five *(Continued)*

TWELVE REASONS WHY THE 1927 FIVE IS A YEAR AHEAD OF ANY OTHER RECEIVER

1.—Because it has extraordinary selectivity without making use of any wavetrap.

2.—Because it is very simple indeed to control—there are three tuning dials only and the readings of two of them are almost the same.

3.—Because the presence of distortion can be seen before it is bad enough to be heard.

4.—Because it makes uses of a novel form of high-frequency coupling that introduces no damping losses into the circuit. Moreover, there are no coupled coils and therefore magnetic losses cannot occur.

5.—Because either four or five valves can be used at will by merely moving a plug; there are no switches.

6.—Because by using suitable tuning units it can be used for efficient reception over a wavelength range from 200 metres upwards.

7.—Because the special system of screening ensures the utmost efficiency by effectively preventing any magnetic interaction between various parts of the set.

8.—Because it has a special control that facilitates searching.

9.—Because it cannot radiate and cause interference with other listeners.

10.—Because the cabinet is sufficiently artistic to blend with almost any type of furnishing.

11.—Because there are no filament rheostats that need adjusting.

12.—Because the best quality components have been used in the construction throughout.

A thirteenth reason—because the WIRELESS MAGAZINE *designed, built and TESTED it!*

ebonite former, 3 in. in diameter and $3\frac{3}{4}$ in. long. A similar panel is fitted into one end of the former carrying four plugs mounted in positions similar to the aerial coil.

Wound in Three Sections

Altogether ninety turns of No. 28-gauge d.c.c. wire are wound on in three sections each of thirty turns, each section being spaced $\frac{1}{4}$ in. from the next on the former.

Although the ninety turns are wound in three sections there is no break in the winding—looped tappings being taken at the thirtieth and sixtieth turns and, together with the beginning and end of the coil, are brought down and soldered to the plugs. These connections are clearly shown in the sketches of the anode coil.

Three coil-mounting bases, identical in design, are required, fitted with sockets spaced to take the plugs mounted on the coil. Connections to the sockets are brought out to four terminals mounted symmetrically round the circumference of the ebonite base.

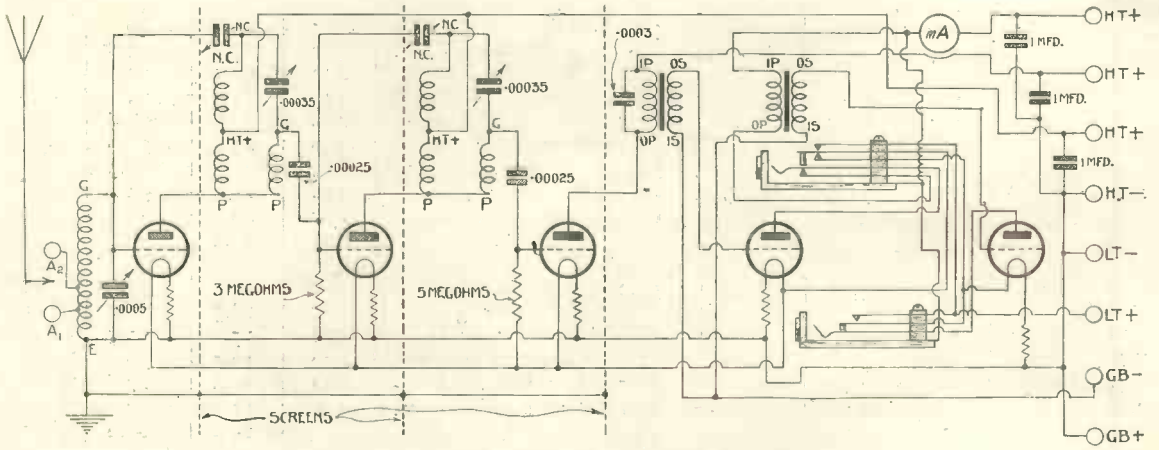
As these connections will be made on the under side of the ebonite base it is important that they should not touch the wood base on which they are mounted.

Other coils will be required if it is desired to receive Daventry and other stations working on higher wavelengths. Specifications for these coils will be given next month.

A good set should be housed in a cabinet worthy of the receiver it contains. Detailed dimensions are given of the actual cabinet employed for the benefit of those who desire to make the cabinet themselves. An identical cabinet may be obtained from the Unica Cabinet Co., of 73, Camden Street, London, N.W.1.

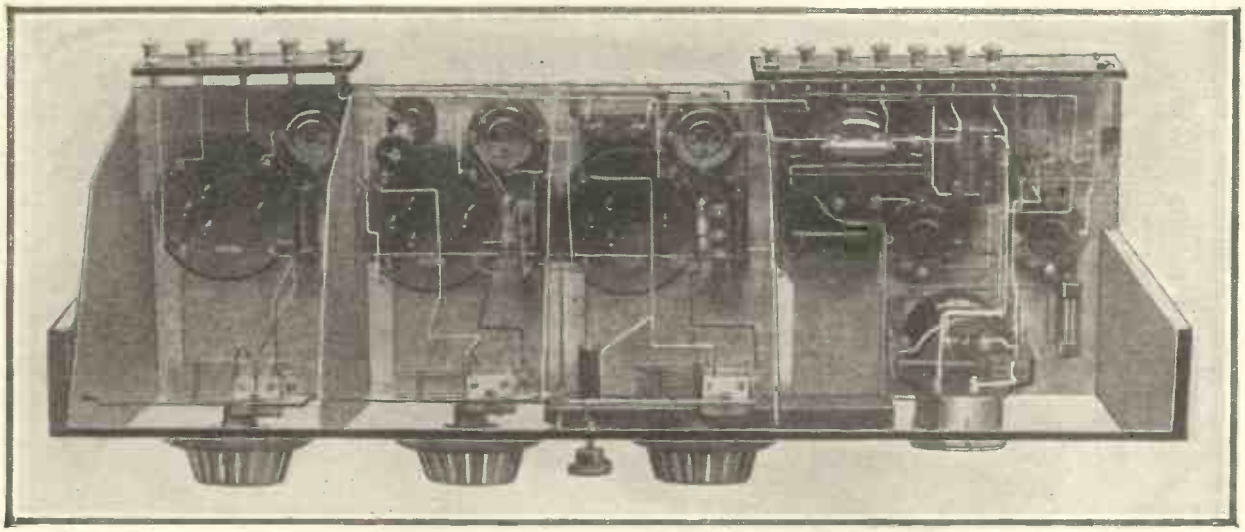
The baseboard and wood brackets, also shown in a dimensioned sketch, may be obtained from the same firm.

The cabinet is finished in oak, which, together with the grained



Circuit Diagram of the 1927 Five.

A Set About Which Everybody Will Soon Be Talking



The Disposition of the Components on the Baseboard of the 1927 Five is clearly shown by this photograph.

ebonite panel and dials, gives a very pleasing effect which is further strengthened by the slight slope given to the panel.

Other components required are given in the following list :—

Cabinet and baseboard (Unica Cabinet Co.).

Grained ebonite panel, 27½in. by 7in. (American Hard Rubber or Becol).

Terminal strips, 10in. by 2in. and 6in. by 2in. (Siemens or Trelleborgs).

12 engraved terminals (Eastick or Belling and Lee).

.0005-microfarad variable condenser (Igranic-Pacent S.L.F. type or Ormond, G.E.C., Raymond S.L.F.).

Two .00035-microfarad variable condensers (Igranic-Pacent S.L.F. type or Ormond, G.E.C., Raymond S.L.F.).

Three 4-in. mahoganite dials (American Hard Rubber).

Panel-mounting milliammeter, reading 0-10 or 20 milliamperes (Sifam).

Set of special coils made to our specification complete with baseboard mounting (Burne-Jones).

Four aluminium shields (Burne-Jones).

Two neutralising condensers (McMichael).

Five baseboard-mounting anti-microphonic valve holders (Lotus or Benjamin, Burndept).

Five fixed filament resistors (Burne-Jones).

Two .00025-microfarad grid condensers (T.C.C. type SP or Dubilier, Mullard).

One 3-megohm and one 5-megohm grid leak (Ediswan or Dubilier, Mullard).

Two jacks (Igranic-Pacent types 65 and 66).

One plug (Igranic-Pacent Auto-plug).

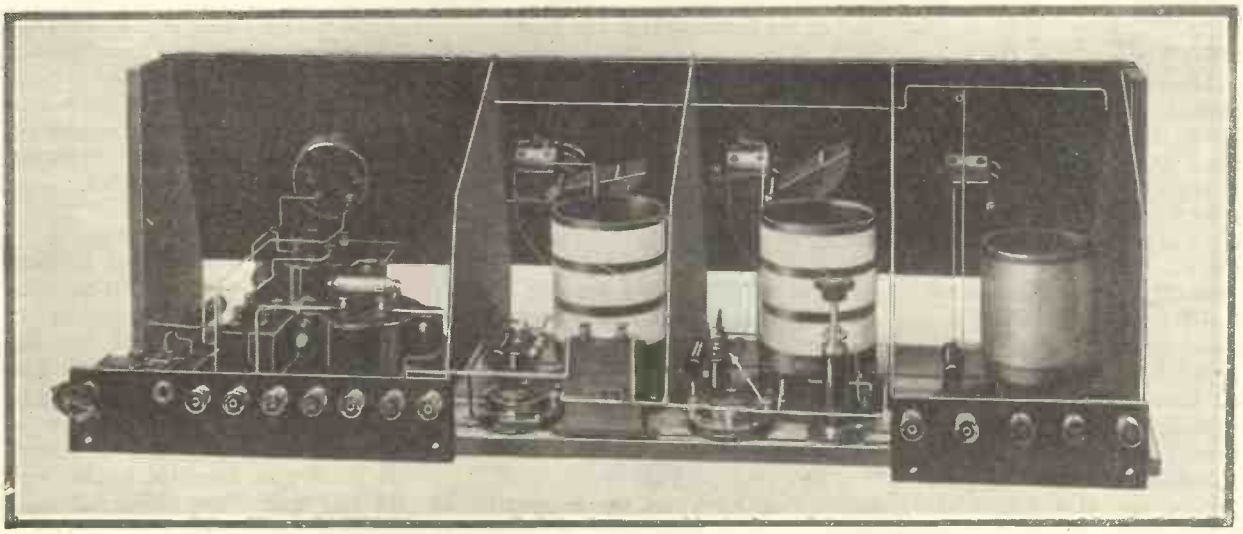
Three 1-microfarad fixed condensers (Dubilier-Mansbridge or T.C.C.).

Two L.F. transformers, ratios 2.7 to 1 and 4 to 1 (Marconiphone).

.0003-microfarad fixed condenser with clips (Wates K).

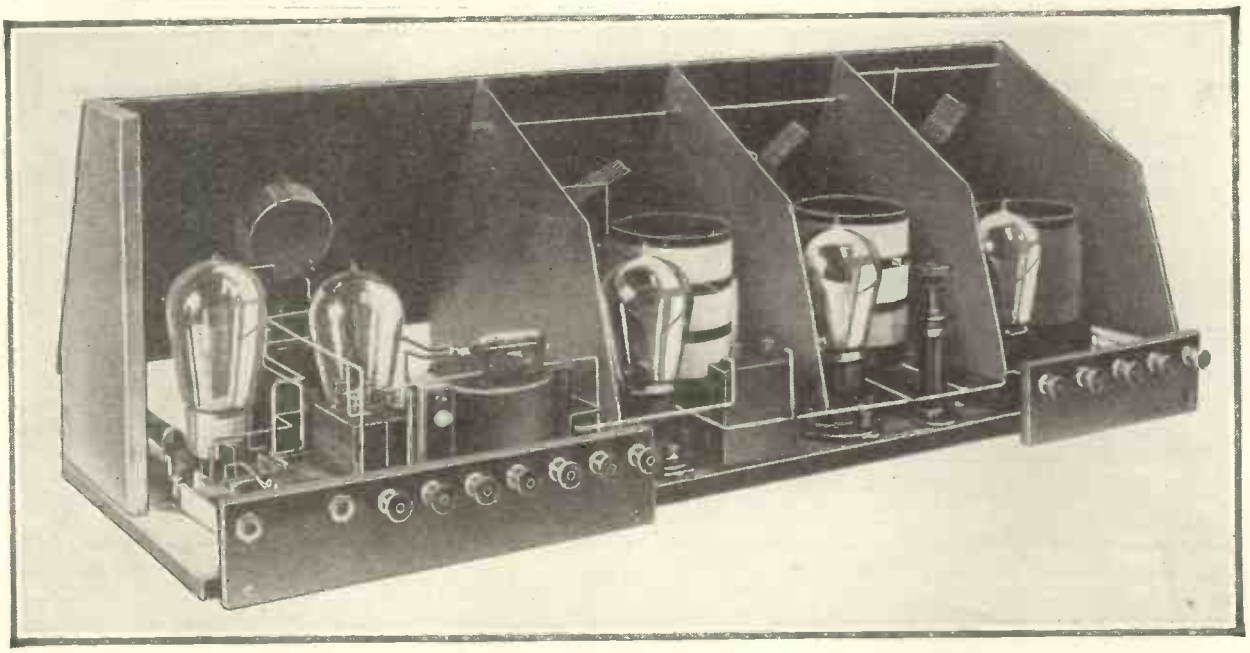
Ebonite Panel

An ebonite panel is essential (as there are no components at a common potential that can be efficiently mounted on a wooden panel), and for



This photograph shows the Special Shielding Arrangement used in the 1927 Five.

The 1927 Five *(Continued)*



Another photograph of the 1927 Five showing the valves in position.

the sake of appearance we recommend the use of one of the grained types in imitation mahogany. This, together with the oak cabinet and the grained dials, presents a particularly handsome appearance, and the comment of all those who have inspected the receiver has been made with regard to its striking appearance and beauty.

The nearest standard panel size should be obtained from one of the makers indicated in the list of components. If a standard size is obtained, a certain amount of cutting and trimming will be necessary.

Nearest Standard Size

The nearest standard size of panel supplied by the American Hard Rubber Co. is 30in. by 7in., and a strip 2½in. wide will have to be sawn off one end. With a further small amount of cutting, this superfluous strip will make the smaller of the two terminal strips—6in. by 2in.

Having cut and trimmed the edges of the panel, the latter should be drilled according to the Structograph, which shows the positions and sizes of all the holes necessary for mounting the three variable condensers, neutralising condenser, and the milliammeter on the panel.

Holes are also drilled along the shorter edges of the panel for fixing the latter to the two wood brackets mounted one at each end of the baseboard.

With the exception of the milliammeter, all the components mounted on the panel have a one-hole fixing device, and the only trouble that may be experienced is the making of the large hole required for mounting the milliammeter.

The best method of making this hole, if only a few tools are available, is to draw on the back of the panel the actual size of the hole required, together with the three small holes necessary for bolting the flange of the instrument to the panel.

Now draw another circle concentric with the large circle, but having a diameter less by ⅛in. than that of the large circle. Spaced at intervals of a little more than ⅛in., small punch-marks are made round the circumference of the inner circle, after which holes are drilled at these marks, using a $\frac{3}{32}$in. drill.

It will be found an easy matter, when all the holes have been drilled, to remove the centre piece of ebonite by a smart tap with the shaft of a small hammer. The edges of the hole should then be smoothed and rounded by means of a half-round file.

This completes the preparation of the panel, and the condensers and milliammeter can now be mounted in position and the whole laid aside until the mounting of the components on the baseboard is finished.

The remainder of the components are mounted on the baseboard. It is very important that their arrangement is similar to that shown in the photographs and the Structograph coloured plate.

Each H.F. stage and the detector stage are screened by means of the aluminium sheets separating them. Before the screens are mounted in position a hole should be drilled through each, so that when they are in position they may be connected together and supported by small lengths of screwed brass rod inserted in each of the holes and clamped each side of the screen by a nut. The method of connecting them together is shown in the accompanying sketches.

Fixing the Screens

One screen is fixed into position close up to the wood bracket supporting the panel, and is clamped to the bracket by a 2 B.A. bolt passing through a countersunk hole drilled in the bracket. This is clearly shown in the sketch. The second screen is mounted 6in. from the first screen, the third 5½in. from the second, and the fourth 6in. from the third.

In the compartment formed by the

The Receiver That Is A Year Ahead

first and second screens the aerial-coil mount, first H.F. valve holder, and resistor are mounted. When the panel is attached to the brackets the aerial-tuning condenser will also be enclosed in this compartment.

The second compartment contains the first H.F. anode coil, a valve holder, resistor, grid leak and condenser, and the baseboard-mounting neutralising condenser. The anode-tuning condenser will also be included.

Detector Valve

The detector valve, together with the second anode coil, grid leak and condenser, resistor, and a 1-microfarad fixed condenser, are contained in the third compartment. Here, again, the second anode-tuning condenser and the panel-mounting neutralising condenser will fit in when the panel is mounted.

On the remaining portion of the baseboard the low-frequency amplifying components are mounted. These components include the two L.F. transformers, H.T. by-pass condensers, two valve holders, and resistors.

For the exact positions of all these components—and their positions, as previously indicated, are very important—the Structograph and photographs should be consulted.

The smaller of the two terminal strips, carrying the two aerial and earth terminals and the H.T. positive and negative terminals supplying the two H.F. valves, is screwed to the back edge of the baseboard behind the aerial-coil unit, flush with the end of the baseboard.

The larger terminal strip carrying the two jacks, L.T., grid bias, and the remaining H.T. terminals is mounted on the back edge of the baseboard at the opposite corner.

Drilling arrangements of the strips and the positions of the jacks and terminals can be determined from the Structograph.

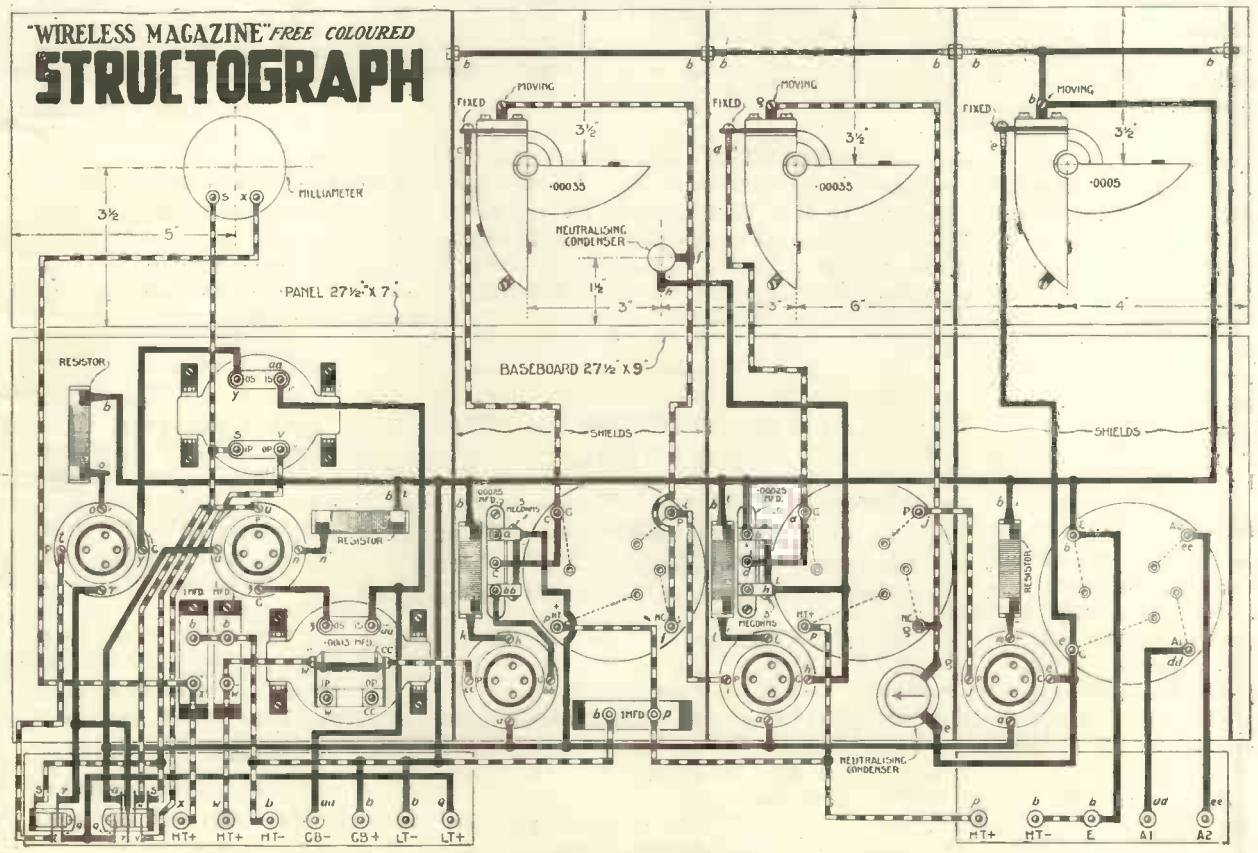
After all the apparatus has been fixed in position, the panel may be attached to the wood brackets by means of ½in. countersunk brass wood screws, two at each end.

The next step in the construction is the wiring, which is a little complicated. It is at this point where the Structograph is most useful, and constructors should take full advantage of it. There is no excuse for a mistake in the wiring if the Structograph is repeatedly consulted. All the wiring is shown in thick coloured lines, the black, red, and red-and-white lines denoting the grid, filament and plate circuits respectively.

Each Terminal Marked

Every terminal, moreover, is marked with a small letter of the alphabet to indicate the sequence in which the wiring should be carried out. All those terminals marked *a* should be connected together first, then all those marked *b*, and so on. After the points marked *z* have been connected, those marked *a a* should next receive attention.

Keep the connections short, especially in the H.F. part of the set.



Reduced reproduction of the Structograph of the 1927 Five given free with this issue.

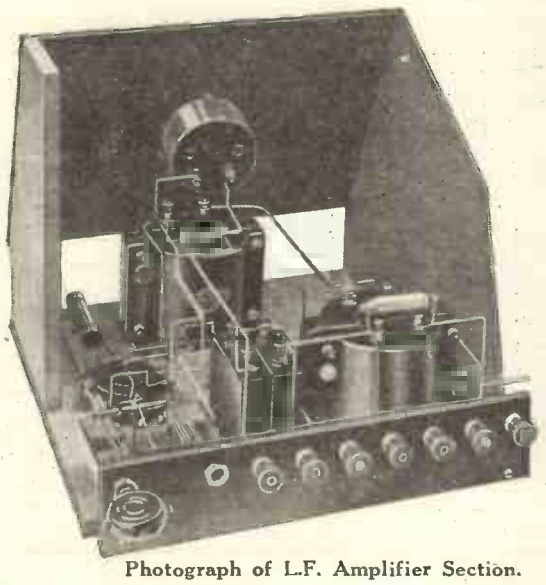
The 1927 Five *(Continued)*

All connections leading from one compartment to the next are taken down through the slot cut out of the bottom of the aluminium screen.

Milliammeter Connections

The milliammeter is connected up in such a manner that it is always in the plate circuit of the last valve in use. That is, when all five valves are being used, the milliammeter is in the plate circuit of the fifth valve, whilst when only four valves are in use the milliammeter is automatically switched over to the plate circuit of the fourth valve.

The use of the milliammeter is to detect distortion in the L.F. stages. If the needle of the instrument is seen to oscillate during, say, a loud passage of an orchestra, then it can be taken that distortion is present, although the ear may not detect it. In short, the milliammeter affords a very delicate indication of whether or not the reception is pure.



Photograph of L.F. Amplifier Section.

Now we come to a very important factor—the choice of valves. In this respect we recommend Osram or Marconi valves, type DE5B, followed by a DE8 H.F. for the second H.F. and a DE5B for the detector. Those are the valves we used in the original receiver, and we can recommend them as giving excellent results.

For the L.F. portion of the set, a DE5 and a DE5B should be used.

Batteries

A 6-volt accumulator of at least 40 actual ampere-hours capacity will be required, together with an H.T. battery *of large capacity*, having a maximum voltage of *at least* 120. The first 90 should preferably be tapped in stages of 3 volts.

Finally, a grid-bias battery having a maximum voltage of 9, tapped every 1½ volts, will be needed.

The set can now be given a preliminary test, and for this purpose the valves and coils should be inserted, and the batteries, phones (or loud-speaker), aerial, and earth connected up to their respective terminals.

The H.T. voltage applied to the plates of both H.F. valves should be approximately 40 volts. The detector requires about 60 volts, and the L.F. valves 120 volts with about 6 negative grid-bias volts. These values are based on our tests, but other values should be tried.

CAN YOU DO BETTER THAN WE HAVE DONE?

When you have built your 1927 *Five and used it for a day or two, write and tell us what results you are able to get. Our Technical Staff will take a personal interest in every* 1927 *Five that readers make.*

Insert the phone plug into one of the two jacks on the terminal strip at the back, and by rotating the three tuning dials attempt to tune-in the local station.

In all probability the attempt will be accompanied by shrieks and howls, which may be eliminated by adjusting both of the neutralising condensers on the baseboard and on the panel.

To balance the circuit perfectly, the local station should be tuned-in at maximum strength, and the resistor in the filament circuit of the first H.F. valve removed.

Signals will still be heard, but by adjusting the baseboard-mounted neutralising condenser the signals can be gradually eliminated until they are cut out altogether or become barely audible.

Readjusting Dials

Before the resistor is inserted again, try to tune-in the station by readjusting the condenser dials. If no signals are heard, the first valve is perfectly neutralised.

A similar method is employed to neutralise the second H.F. valve by removing the resistor in the filament circuit of the second valve and adjusting the panel-mounted neutralising condenser until signals are eliminated.

It will now be found that the panel-mounted neutralising condenser can be used as a very smooth control of reaction, or, alternatively, it may be left in the neutralised position.

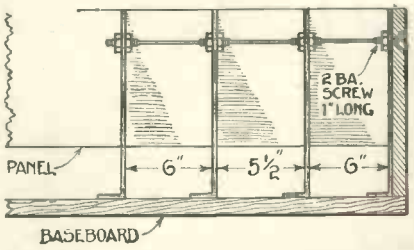
Fine Control

Once a number of stations has been logged and the three dial readings noted, it is necessary, for long-distance reception, to adjust only the panel-mounted neutralising condenser for fine control of reaction.

After this rough test, the receiver can be placed in its cabinet and the sliding-back panel of the latter placed in position.

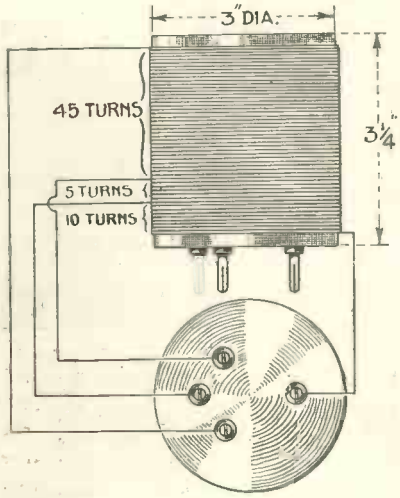
[*Further details of operating, general hints, and the construction of the long-wave coils will be given next month.*]

A Special "Wireless Magazine" Design



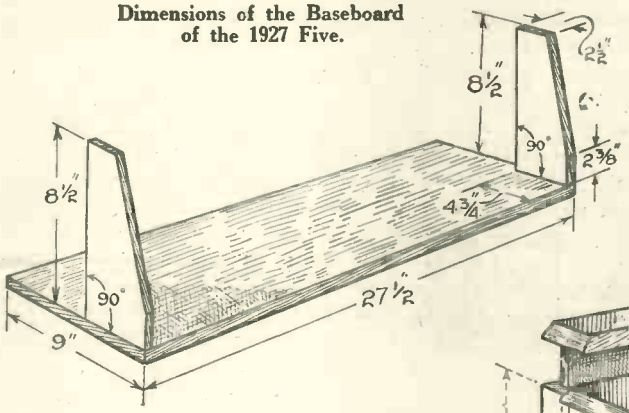
(Left).—Diagram Showing Positions and Spacing of Screens.

(Right).—Details of Aerial-tuning Coil, Showing Underside of Base.

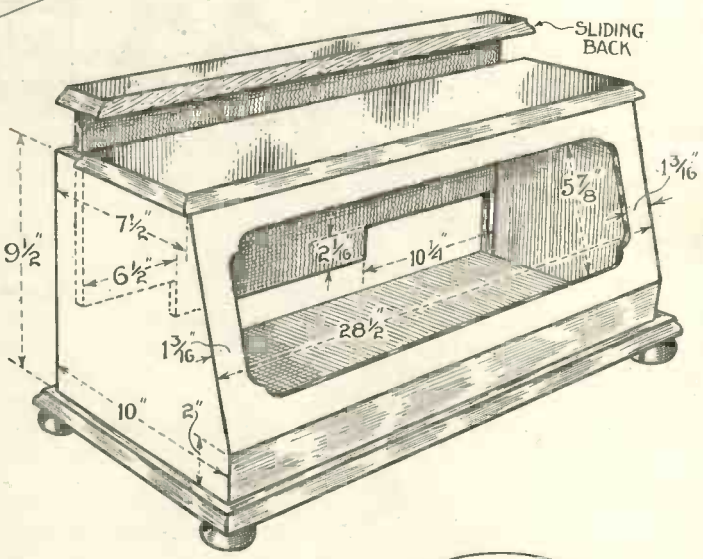


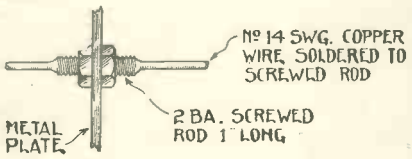
SOME DETAILS OF THE 1927 FIVE.

Dimensions of the Baseboard of the 1927 Five.

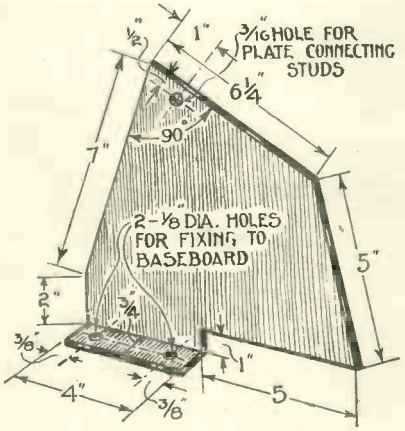


(Below).—Details of the Cabinet of the 1927 Five.



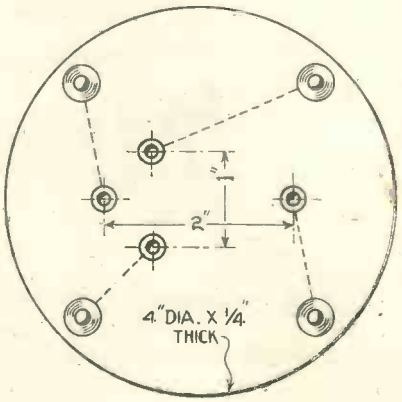


Method of making connection to screens.

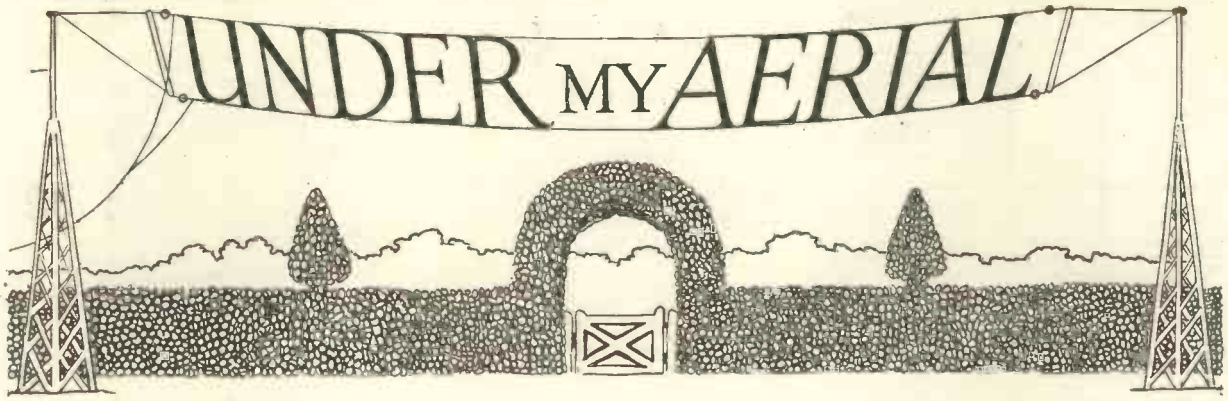


(Left).—Dimensions of Screens for Shielding the 1927 Five.

(Right).—Details of Socket Platform into which Tuning Coils are Plugged.



Halyard's Chat on the Month's Topics



The New Wavelengths

THE new European wavelengths, as allotted in the "Geneva plan," if they do nothing else, will make the coming winter season one of peculiar interest to the wireless enthusiast who likes to reach out into the distance with his receiving set.

If the Geneva scheme is adhered to, we should experience little difficulty in picking up the majority of those European stations which are the proud possessors of exclusive wavelengths.

The old, familiar Continental stations, however, will come popping in at unfamiliar readings on our tuning condenser dials for a while.

Since the wavelengths to be used by European broadcasting stations this coming winter have been chosen so that no two of the corresponding frequencies are separated by less than ten kilocycles, there should be a welcome absence of mutual interference between pairs of stations.

It will be on the "common" wavelengths, however, that the DX hound should have the most exciting sport this winter. Sixteen of these common wavelengths have been put into commission, and the number of

Language of the announcer.

different stations using the same common wavelength varies from two to ten.

Of course, the stations using common wavelengths are low-power stations, but, all the same, some of these stations will get over to us at times. If you do pick up a Continental station on one of the common wavelengths, you will have to listen carefully and identify the station by the language of the announcer.

An Autumn Task

Don't you think you ought to overhaul your aerial and earth thor-

This doleful information.

oughly this autumn before the bad weather sets in?

My meteorological friend insists that October is the month during which we pass from the quiet, settled weather of summer to the boisterous, unsettled weather of winter. Further than that, this optimistic acquaintance of mine reminds me once again that our winter gale season begins in October and does not end until March is out.

Worse still, my meteorological friend forecasts that many more aerial masts will be blown down this winter than during any preceding winter.

After all this doleful information, I am sure you will set about a complete overhauling of your aerial and earth installations while there is a bit of good weather left.

I have already carried out a thorough inspection of my aerial and earth, and, from my experience, I should like to suggest one or two things for your special consideration this autumn.

First of all, if you find that your aerial wire has so blackened and corroded that the strands have "run together" to form one solid wire, scrap the wire and put up a new length. It will pay you to do so, just as it has paid me.

Next, don't forget to give the pulley ropes on your aerial mast a jolly good testing. I put my pulley ropes "through it" all right, with the result that I broke one of them. As the mast was strapped to a tree, however, it was not a hard job to take the mast down and fit a new rope through the pulley.

While I was fitting this new rope I derived much comfort from the thought that it was better to have a broken rope on a fine September morning than during a raging snowstorm in the middle of winter.

A Wireless Census

I wonder if it is quite outside the bounds of possibility for a complete census to be taken of all the wireless installations in our islands?

Such a census would give us precise information on many debatable points. For one thing, we should find out which really is the favourite circuit of the valve user. For another thing, we should learn from the figures of a wireless

Figures of great interest.

census the correct proportion of crystal sets to valve sets. We should also obtain the exact number of loud-speakers in use.

What would interest you the most about the figures resulting from a complete wireless census? I know what would interest me the most. It

Halyard's Chat on the Month's Topics

would be the answer to the following question :—

How many wireless enthusiasts *still* use high-frequency amplification?

The italics are mine, if you please, and thank you for agreeing with me, wholly or in part, that high-frequency amplification is as dead as the proverbial door-nail, or, to come nearer home, the spotless wireless crystal.

I should also be greatly interested to learn from a wireless census the proportion of single-wire aerials to multi-wire aerials, the proportion of inverted-L aerials to all other types of aerial, and the proportion of water-pipe earths to all other kinds of earth.

Don't you think a wireless census would be an excellent innovation? I doubt if any figures could be of greater interest than those which would result from such a census.

How would it be if you drew up a census paper for use in connection with a wireless census? Rather an interesting exercise for an evening with dull programmes, isn't it?

A Representative Sample

While waiting for a complete and proper census of our wireless sets, we must perforce content ourselves

An international set.

with the consideration of the figures available from representative samples.

I should think that one of the most representative samples of our two million British wireless sets is that recently obtained by the WIRELESS MAGAZINE and *Amateur Wireless* in connection with the International Set Competition organised by those two periodicals.

In this fully representative collection of sets made by the British amateur wireless constructor, probably the most striking feature is that, in the great majority of the sets, the circuits used were straight circuits.

I suppose that the ordinary straight circuits will always appeal to a large number of constructors because of the straightforwardness in construction and use which follows their adoption.

What interested me most particularly though, with regard to the sets sent in for consideration in the International Set Competition, was the great popularity of the Reinartz circuit with the British home constructor.

I am really quite delighted with this popularity of the Reinartz circuit for, if I were asked to say which was my own favourite circuit, I think I should say that it was still the Reinartz.

The first Reinartz set I ever made is at present on my junk shelf. It would scarcely have been suitable for the International Set Competition.

My last Reinartz set is on the table of my "reception room" at the present moment, and it has been in constant use for over two years.

The Loud-speaker Nuisance

How do you feel about this loud-speaker by-law question? Would you support your town council if it decided to follow the example of the Reading Town Council and pass a by-law prohibiting the use of loud-speakers in public places where there is any likelihood of annoyance being caused to residents and others?

I think I should give my town council all the support I could over the question of the suppression of the loud-speaker nuisance for the simple reason that, in so doing, I should be helping, not hindering, the progress of wireless.

The great offenders in making a loud-speaker a real nuisance to the public are the wireless dealers. It does seem strange that these men of wireless business cannot see that,

Full blast on different programmes.

by making so much noise with their loud-speakers in the streets, they are turning far more people against wireless than they are attracting to it.

Near my home there is a road in which there are two wireless shops within a hundred yards of each other. Sometimes at night, the owners of these two shops have their loud-speakers going full blast outside *on different programmes,* and the noise is dreadful.

One curious thing I have noticed about these two outdoor loud-speakers is that, when both are shouting out the same programme, you get a peculiarly blurred effect at certain points along the road. I imagine that this blurred effect is caused by similar sound waves from the two loud-speakers reaching the ear at slightly different times, one sound wave having to travel farther than the other.

Wireless Geography

If you want a really good exercise in geography, take a map of Europe and try to find the positions of the hundred and seventy-nine broadcasting stations named in the Geneva plan for the redistribution of European wavelengths.

With a good gazetteer and a little patience over variations in spelling you should find pretty well all the stations named. I was only set fast over fourteen of the stations, and I am sure you could do better than that.

A more ambitious and very useful exercise is to mark the positions of

Which station is furthest away.

all these broadcasting stations on a blank map of Europe. Luckily, I had such a blank map by me, and when I had completed my work, I was very pleased with the result.

It is well worth compiling your own map of the European broadcasting stations. From it you will see which station is the farthest away from you, which is the most northerly station, which the most southerly, and which country has the best distribution of stations. These are but a few of the many interesting features you will read from your map.

How would it be if you made up such a map and put a ring round each station as you heard it for the first time on its new wavelength?

Under My Aerial *(Continued)*

Clock Errors

It would be a grand thing if all the public clocks in the country kept as good time as Big Ben, the famous Westminster clock, which is now as well known to wireless listeners

Public clocks of my little home town.

throughout the world as it is to Londoners.

According to observations made at Greenwich Observatory, where the "time pips" come from, Big Ben is seldom more than a second wrong, and he is never more than two seconds out of it.

I long for such accuracy in the public clocks of my own little home town. Let me tell you why.

From my house to the railway station is a matter of two hundred yards, not more, and there are no fewer than three public clocks in that short distance. There is also a church clock near-by which strikes the quarter-hours.

When I have a train to catch I start by the church clock. At the first bend in the road, a quick glance at the clock over the jeweller's shop causes me to "break into double time, double." Fifty yards of this and then I gaze at the clock over the bank with interest. Bank-time reassures me, and I walk at steady pace until the clock in the square causes me to sprint the last fifty yards to the station.

Luckily, I do not have to catch trains *every* day. If I did, I should start an agitation for the control of all public clocks by wireless.

Those Commissioners

There seems to be a good deal of irritation in many quarters over the delay in appointing the members of the new broadcasting commission which is to take over the control of our broadcast destinies on the last day of the year.

How do you feel about it? Is the delay worrying you? Personally, I think the task of finding commissioners with the characteristics set out in the report of the broadcasting committee is an extraordinarily difficult one, and one which was bound to take a long time.

Consider for a moment what characteristics one of these commissioners must have, and then see if you could find one such amongst your wireless friends. A commissioner must be a person of judgment and independence, free from commitments, with no other interests to promote than those of the public service, and must possess business acumen and experience in affairs. Now which of your wireless friends would answer to that description?

I think George is the one to fit the bill best amongst my wireless friends. He is a man of judgment. I have often seen him talking to the policeman. Certainly he is a man of independence, especially independence of thought. You never know what he is going to say next.

I am not quite sure what commitments are, but I am sure George is perfectly free of them. George's business acumen is only second to that of a Woolworth, and, as for experience in "affairs," well! well! well! the less said the better.

A man of "affairs."

Yes, I must certainly speak to George about this commissioner business.

A Good Aerial

"Seen anything good in the wireless line?" I asked George when I first saw him after his return from his summer holiday.

"Yes, an aerial," he replied.

"George, I can see that your holiday hasn't made you any better."

"But it most certainly has, my dear chap. I have lost that solid dielectric feeling, and my specific deductive capacity has gone up two decimal points."

"Yet you can't give a straight answer to a straight question."

"Who can't? Why, I just gave you a straight answer, to wit, an aerial."

"Worse and worse, George. You might tell me, though, what you have seen of wireless interest on your holiday."

"You've only been on the east coast."

"During my walks abroad, I saw ——."

"But you haven't been abroad, George. You've only been on the east coast."

George looked at me most reprovingly and lapsed into a chastened silence.

"What did you see on your walks abroad on the east coast, George?" I asked, with the smile of one who has scored one.

"As I told you at first, I saw a good aerial, a really good aerial."

"Was this good aerial a very high one?"

"Oh, no!"

"Did it give exceptional results?"

"Couldn't say."

"Then how did you know it was a really good aerial?"

"Saw it was."

"Saw it was? How do you mean you saw it was?"

"Well, you see, old man, one end of it was fastened to a church and the other end to a vicarage."

Your Aerial System

Coming now to things a little more within our reach in aerial-and-earth installations, my recent inspection leads me to emphasise the need for a careful examination of your aerial lead-in and your earthing switch this autumn.

My aerial lead-in is of a type with which you are perfectly familiar, namely, a brass rod through an ebonite tube fixed in the window frame. When I came to examine the outer end of my lead-in, I found much dirt and a little corrosion.

Accordingly, I unscrewed the terminal screw-top from off the brass rod and cleaned its inner face with

Halyard's Chat on the Month's Topics

a file. Then I cleaned the ends of the strands of the down-lead wire.

After I had replaced the end of the down-lead and screwed it into position firmly with the terminal screw-top, I wrapped the outer end of the lead-in with electrician's tape in such a way that all the brass at the end was covered. I am hoping that this tape will protect my lead-in adequately throughout the winter. If your earthing switch is anything like mine, you will find a considerable amount of greenish-white copper sulphate deposited on the copper parts. You must remove all such deposit carefully.

My last suggestion is that you should take your earthing switch off the wall, or whatever it is screwed to, and give it a right good clean.

Things within our reach.

After you have thoroughly cleaned your lead-in and your earthing switch, you will be surprised at the increase in signal strength you will get.

W.F.S.

"Ever heard of the W.F.S., George?" I asked the old rascal as he stopped at the end of my road on his way home last night.

I knew he hadn't because I had only just come out from reading of it myself in the most recent American wireless periodical, and George doesn't buy the American wireless papers. He borrows mine.

George was not at a loss for a reply, however. He never is.

"The W.F.S.," he said. "Oh! yes, Women's Friendly Society, of course. I am not a member."

"You can cut all that right out, George. You know you know nothing about it. Women's Friendly Society, good gracious! I like that. As if the letter W could stand for anything but one thing these days. What does W usually stand for, George? Not women, surely?"

"Does it stand for the other talker, wireless?" he asked meekly.

"I guess so," I replied, "but you'd never guess what the F and the S stand for."

"Like the boy with the bilious attack, I'll give it up," said George.

"The F stands for Farm and the S for School. Now you have it. W.F.S.

Farm education.

—Wireless Farm School. I'll tell you all about it. The United States Department of Agriculture at Washington is launching out on a scheme to educate a million farmers by wireless."

"Hard lines on the American farmers."

"Not a bit of it. The WF.S. is to broadcast courses of instruction on the management of livestock, poultry and crops, and on all manner of subjects of practical interest to the farmer. I consider the American farmer an extremely fortunate man—that is, if he has a wireless set."

"Tough luck on the American BCL, this W.F.S. scheme."

"How is it tough luck on the American broadcast listener?"

"Well, just you imagine switching on expecting to hear the latest Hawaiian music or the newest song-hit and instead picking up a Wireless Farm School lecture on how to feed pigs so as to get the right number of streaks in the bacon."

How Many Wires?

I have just been looking at an advertisement of an American self-contained cabinet set, a handsome example of the work of the American wireless manufacturer. In the advertisement were these words: *Not a wire visible to mar the beauty of the room.*

How does this real "wireless" set compare with your wireless installation? Have you the usual miscellaneous collection of leads to and from your set? Do these leads sadly mar the beauty of your "reception rooms"?

Perhaps, like me, you make periodic attempts to tidy up the leads to your wireless set, and I dare say, like me, you find that when there is serious experimental work to be done tidiness seems to vanish like snow before a summer sun, or, shall we say, like flux before a hot soldering bit.

A schoolboy acquaintance.

For the sake of comparison, let me tell you how many visible leads there are to the three-valve set I have in use at the present time.

First of all, there are the aerial-and-earth leads from the earthing switch near the window. Then there are the two leads from the accumulator which stands on an acid-resisting tray on the floor.

From my high-tension battery, which stands behind the set on the table, there are a negative lead and three positive leads. There are two leads to the loud-speaker, and that's the lot. How many do you make it? Ten?

I'll admit that the table on which my wireless set stands does look a bit wiry at times. Still, if you do not have more than ten leads to your set, I do not think anybody ought to grumble at you.

A schoolboy acquaintance of mine recently wrote the following sentence: "The wires were so fine as to be almost intangible." I think he ought to patent his intangible wires and put them on the market for use as wireless leads. HALYARD.

Tracking A Secret Transmitter

This photograph shows one of the new instruments in use.

The Micro-radio-goniometer!

"HULLO! Hullo! I am a secret radio transmitter. I am master of the ether over Paris. I can send out news which may be true or false. I can express any idea, whether or not repugnant to you. You cannot stop me. If war breaks out I can communicate with the enemy across the frontiers. I can jam your army's messages. . . . Good-night, everyone. You will never find me!"

This startling message was heard by everybody listening on 225 metres recently at 11 p.m. True, it might have been merely an elephantine joke of some lawless radio fan indulging his peculiar idea of expressing the instinct of the Latin races for the dramatic. Or, it might have been genuine.

The French military and police authorities were taking no chances. They at once set themselves to work at tracking down the mysterious transmitter whose messages from a private house would certainly interfere with the broadcast transmission of concert programmes, if they did nothing more serious.

First, the Prefect of the Parisian police called to his aid the radiogoniometer. This device indicates the approximate direction from which wireless messages are coming, by means of a spiral frame of aluminium which shows the angle at which the Hertzian waves strike the receiver. A person turning this spiral frame towards the unknown transmitter hears in the telephone a sharp sound. The nearer the frame approximates to the direction from which the wireless waves are travelling, the sharper the sound in the receiver; but if it is turned in a direction at right angles to that from which the waves are travelling no sound is heard.

It was found that the radiogoniometer required to be supplemented by a more delicate instrument and detector if it were to be able to locate accurately the direction of propagation of short waves which set up an unstable magnetic field.

A French engineer, M. Guy du Bourg de Bozas, has just invented a microradiogoniometer, taking the form of a series of screens adjustable in all directions and angles relative to the horizon and the zenith. This instrument accurately locates the direction not merely of short, average and long wavelengths, but of eddies of frequently-reflected waves whose line of travel is hardest to find.

Three receivers were set up to locate the quarter of the city from which the unknown transmitter was operating. It is found that two receivers are not enough to give clues. Paris has recently been surrounded with a network of these D.F. stations for police and military purposes.

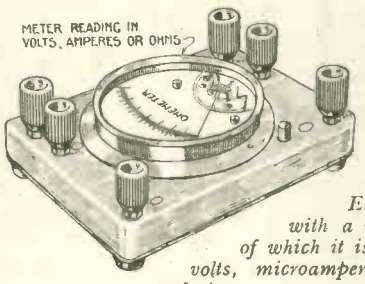
As soon as an unknown radio transmitter is heard in a given area of the city, one of the three receivers telephones to the other two asking them to find the unknown's direction and the wavelength he is using. These two stations then set to work to plot these lines, which should, in theory, intersect at a point exactly marking the locality of the unknown transmitter. In practice, however, the intersecting lines form a little triangle bounding and delimiting a block of houses.

Now an automobile, which looks like an ordinary pleasure or business vehicle, sets out towards the area marked out on the plan of the city. The motorist carries a portable instrument case containing accumulators and wires, mounted on a graduated plate revolving on ball bearings. This is the microradiogoniometer, and it has no aerial. The coils in the box suffice at a short range.

Soon the automobile reaches the suspected location of the secret transmitter and stops at a point close to one of the apices of the triangle plotted by the two stations. The motorist revolves the microradiogoniometer on its graduated base and takes a measurement, which he plots on a large-scale street map of the district. He takes two other observations at two other points, which he marks on his plan, and the three lines intersect in a point which represents the house or site of the concealed transmitter.

H. T. W.

Novelties and New Apparatus Tested and Approved by our Technical Staff



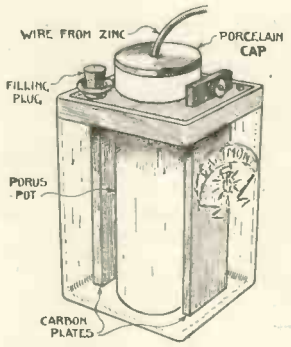
For those who like to make their own tests and electrical measurements the One-meter, shown in the accompanying illustration, will be found extremely useful. There is no limit to the number of uses to which it may be applied. Each instrument is supplied with a range of multipliers by means of which it is possible to read millivolts, volts, microamperes, milliamperes, amperes and ohms.

The instrument's figure of merit is 500 ohms per volt and the current consumption is of the very low order of 2 milliamps at full scale deflection. Other advantages worth noting are the dead-beat action, safety double contact key, sapphire bearings, zero adjuster, knife-edge needle and double scale.

Altogether there are 58 ranges for each of which a special shunt or multiplier is required.

They may be obtained from Leslie Dixon & Co., of 219, Upper Thames Street, London, E.C.4.

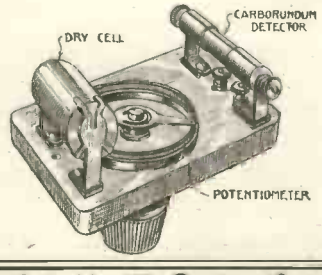
The sketch shows a new and efficient primary cell known as the Darimont "Home-Service" Battery. An outstanding feature of this battery is that it is a two-fluid cell which gives a constant current at a satisfactorily high E.M.F. and depolarisation is more effective and more rapid with a liquid depolariser than with one that is solid. Hitherto, the use of such cells has been hampered by the diffusion taking place between the two liquids, which not only renders them non-effective after a time, but may tend to serious corrosion of the zinc, even on open circuit.



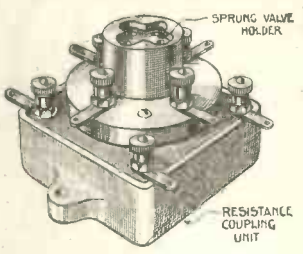
Difficulties caused by diffusion have been overcome in the Darimont battery by the liquids themselves forming a semi-permeable membrane in the pores of a porous pot. The cell is easily recharged without using any type of charger, by simply renewing the exciter paste, "Radiogene" and the zincs, all of which may be obtained from the makers.

The type illustrated has an actual capacity of 24 ampere hours, at a discharge of .5 ampere. The makers are Darimont Electric Batteries, Ltd., of Abbey Road, Park Royal, N.W.10.

This carborundum crystal stabilising detector unit is made by the Carborundum Company, of Manchester. It consists of potentiometer, crystal and battery mounted on a moulded ebonite base. This unit is of the single hole fixing type, and so may readily be attached to the front panel, or, if space is limited, it may be fastened in the most suitable position, a hole being provided underneath the contact stop for this purpose. Where sharp tuning on a nearby station is required, and when an amplifier is used to work a loud-speaker, this unit is to be recommended. The unit is connected in place of the usual crystal on an existing set.



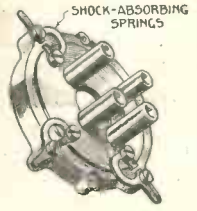
Resistance-capacity coupling is becoming deservedly popular for the reason that it gives the truest amplification.



The sketch shows how compact a resistance-capacity coupling unit may be made. The base contains the plate resistance, the coupling condenser and grid leak; the connections to which are brought out to terminals. On top of the unit is a valve holder.

The manufacturers are Metro-Vick Supplies, Ltd., of Metro-Vick House, Charing Cross Road, London, W.C.

A neat baseboard-mounting valve holder of the anti-microphonic type is illustrated. This component is made in two pieces, an inner "floating" platform on which the four valve sockets are mounted, and an outer moulded ring.



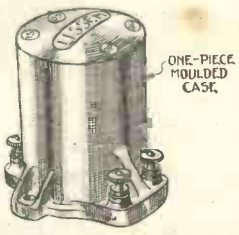
Four C-Springs serve the double purpose of connections to the valve socket, and providing the floating property.

Harlie Bros., of 36, Wilton Road, Dalston, London, E.8, are the makers.

An attractive-looking transformer is being produced by Lissen, and we are informed that the manufacturers are withdrawing all their other types of transformers.

An internal inspection reveals that both primary and secondary windings are wound on a core of soft iron wires, the whole being enclosed in a one-piece moulded case and the connections brought out to form terminals fitted round the base. Each terminal is clearly marked for connecting purposes.

On tests we have found that the amplification obtained is large and undistorted and that the lower frequencies are reproduced with exceptionally strong amplification.



Lissen, Ltd., of Lissenium Works, Friars Lane, Richmond, Surrey, are the manufacturers.

Is Broadcast Acting Only Elocution?

A Special Article by Lilian Braithwaite

I HAVE never been asked a more puzzling question. There is so much to be said on both sides, and in the background, complicating every issue, there is the certainty that radio acting must require a technique of its own which has not yet been discovered and may not be fully formulated for a long time.

What Can the Voice Do?

The puzzle really resolves itself into this: Can the voice alone transmit the whole strength of acting which on the stage is conveyed by voice, hands, face, attitude, gestures, movements and that strange, impalpable thing called personality?

In fact, the list of acting "media" in the theatre does not even end there. The audience itself helps to play the actors' parts.

After every stage performance one at least of the players may be heard to remark that "the audience was good"—or "bad." The meaning is not that the audience was easily pleased or coldly critical, but that it either succeeded or failed to *live in the play*.

When an audience feels with the players the drama is a hundred times more tense—as any actress knows who has played to both crowded and occasionally deserted auditoriums—so that the credit for effective acting does not wholly belong to the artists. Throughout every successful performance there is a continuous interchange of emotion between the players and the audience, each spurring the other to more exalted heights.

No "Infection"

In broadcasting this is not possible. Not only are listeners unable to reflect dramatic feeling back to the actress, but every hearer is also isolated, so that listeners cannot even "infect" each other as they do in a theatre.

Every playgoer can remember occasions when one person's unrestrained amusement at a comedy piece has set the whole audience rocking with laughter.

Through this isolation radio acting is debarred from that "fine frenzy" not infrequently achieved in the theatre; but there is still the other side of the problem: Can an actress transmit *her* emotions to listeners? And here one gets into deeper water.

Tension—one mainstay of drama—is ruled out through the impossibility of co-operation from the audience. But can listeners be roused to *emotion* without seeing the actor?

At first one is inclined to say definitely "No." The acting of Mr. Seymour Hicks, back in *The Man in Dress Clothes*, Mr. Hay Petrie's simian mumming in *The Monkey Talks*, Mr. Godfrey Tearle's "life-story in an attitude" in *White Cargo*, Mr. John Barrymore's pregnant gestures of the hands in *Hamlet*, and a score of other *visual* pinnacles of acting marshal arguments against the unqualified success of merely auricular acting.

Thrilling the Blind

But—and it is a very big but—many *blind people* are known to be as thrilled at a play as those who can watch the action. I have blind friends myself who assure me they miss nothing even in mystery drama, given only an occasional word or two of elucidation from companions.

The blindness of radio listeners is perhaps not quite the same, because they have objects in their rooms or gardens to distract their attention through the eyes. But at any rate such evidence forms a stronger case in support of radio drama as a field for genuine acting.

And although her presence is probably essential for an actress to "hypnotise" her hearers, as many do on the stage, yet even before the cold and unresponsive microphone it is impossible to play some scenes—such as Hermione's trial scene—without such a "feast of reason and flow of soul" as must in some degree reach radio listeners.

Complicated Speech

Hermione is perhaps not a fair test of the effectiveness of radio acting. Many of her speeches are so erudite and complicated that it is difficult enough to convey her meaning on the stage, where gesture and movement help the understanding.

Nevertheless three listeners assured me the part gripped them, and two at least must have been unprejudiced—one a stranger and the other a

stage-door keeper. Stage-door keepers have no beautiful illusions about dramatic art.

The third—my mother—confessed her imagination was helped by mental pictures of me in Hermione's flowing robes going through the stage movements she knows so well.

Probably if radio actors and actresses invariably rendered *rôles* for which they are well known—Miss Sybil Thorndike's Queen Catherine, for example—the listener's task would be very much easier.

Miss Thorndike, I am told, asserts that no radio acting has ever given her a thrill except Sir Johnston Forbes-Robertson's. Voice is everything, of course, in broadcasting, and Sir Johnston's is probably the most beautiful of present-day actors' voices. There is no thrill like the thrill of listening to perfect speech with all the power of intense thinking behind it.

Perhaps, as radio technique evolves, a school of players will arise whose talent is all in the voice. There must be many people with exquisite speaking voices but personalities unsuited to the stage.

Perfect Rendition

A perfect voice rendering poetic drama with power and sincerity through the microphone is probably the highest pinnacle of dramatic art wireless will ever attain. But even so that is much more than simple elocution.

Though diction and phrasing are vitally important in broadcasting—I have listened to a few speeches from Savoy Hill which simply pattered on the ears like rain on a window—the thought and beauty of the lines mean more. My Hermione, if she succeeded at all, succeeded on the exquisite poetry of her part, and this makes me think that essentially modern drama—concerned as it is with action rather than language—will never have the success in broadcasting that reports impute to the Shakespeare heroine series.

Probably the series would be still more popular—as acting—in the winter months, when the loud-speakers are brought in from the gardens and the rivers and greater concentration is possible for listeners. If poetic drama becomes a permanent feature of the wireless programme I, for one, should like very much to act again before the microphone. Partly because, in spite of the eerie feeling of closing one's book and walking away in silence at the end of the performance, I enjoy the work, and partly because broadcasting is a wonderful training for dramatic artists.

The effort of concentrating all expression and emotion into the voice without relying on any other means to recapture the audience's attention must be a most valuable experience.

If one could only both act and listen to oneself the lesson would be still more valuable. The first sight of myself in films taught me one or two useful, if unpalatable, facts about my walk; perhaps if I could listen to myself over the wireless I might learn some home-truths about my diction and contribute some of that radio acting technique which will have to be discovered before the dramatic section is perfect.

Miss LILIAN BRAITHWAITE

began her stage career in a Shakespearian tour of South Africa with the late William Haviland after only six months' experience in amateur productions. On her return to England she undertook at two days' notice a big part in Pericles *with Sir Frank Benson. Engagements followed with Fred Terry, Mrs. Langtry, Sir Herbert Tree, Cyril Maude, Lewis Waller, Gerald du Maurier and Sir George Alexander. London first "discovered" her in* Sweet Nell of Old Drury; *amongst her greatest successes have been parts in* Mr. Wu, The Merchant of Venice, *and Noel Coward's* The Vortex.

Grid Bias from the H.T. Battery

MOST modern valves, especially dull-emitters, require a certain grid-bias voltage in order to enable them to give best results in L.F. amplifying stages. There is no reason why the grid-bias voltage should be critically adjustable, and it is usually sufficient to use two or three 1½-volt cells for the purpose, fine control of the operating conditions being obtained by adjusting the H.T. voltage.

Special Battery Unnecessary

There is no need to use a special grid-bias battery when the H.T. battery is tapped at every 3 or 4½ volts (as most of them are), as the first two or three cells from the negative end of the H.T. battery can be utilised for the purpose.

First, it must be ascertained that the H.T. negative and L.T. negative terminals of the set are connected together internally. If this is not so, the H.T. negative terminal must be altered.

The negative H.T. wander-plug is then inserted, not in the first socket of the battery, but in the one next to this. A lead provided with a wander-plug is fastened to the G.B. negative terminal of the set, and this plug inserted in the extreme negative socket of the H.T. battery.

The G.B. positive terminal is not used when this method of obtaining a grid-bias voltage is employed.

K. L. M.

A GERMAN poet has been reading his own poems before the microphone. A case of the punishment fitting the crime.

SCIENTISTS are now producing imitation sunshine. That's nothing. Some of our announcers have been producing imitation Oxford accents for years past.

Completed Wavemeter and Armstrong-Super Unit.

A Combined Wavemeter and Armstrong Receiver

Designed by SYDNEY BRYDON, D.Sc., M.I.E.E. and the "W. M." Technical Staff

ALTHOUGH the four-electrode valve has been with us some years now, it has never enjoyed the popularity it deserves. The reason for this cannot be due to the lack of circuits that can be tried with this valve, for many have been developed, some of which are extremely good.

Reduced H.T.

The reduced high-tension voltage needed for successful operation should also be an attraction, but no—the majority of experimenters stick to the three-electrode valve.

The reason for this faithfulness must be due to other causes; perhaps the somewhat high initial cost of these double-grid valves is the deterrent, or perhaps the average amateur is wedded to the usual three-electrode methods of amplification, oscillation, etc., and views with distrust the seemingly odd-looking hook-ups disclosed in four-electrode valve circuits.

Or again, perhaps the current ill-founded belief that these valves work best without any anode battery at all has lead some unfortunate experimenters astray.

Whilst admitting that the double-grid valve does not require a high anode voltage, we nevertheless maintain that some anode volts are necessary in order that the best results may be obtained. Of course, some results can be obtained without the use of an anode battery, but they are not comparable with those resulting from the proper use of the valve.

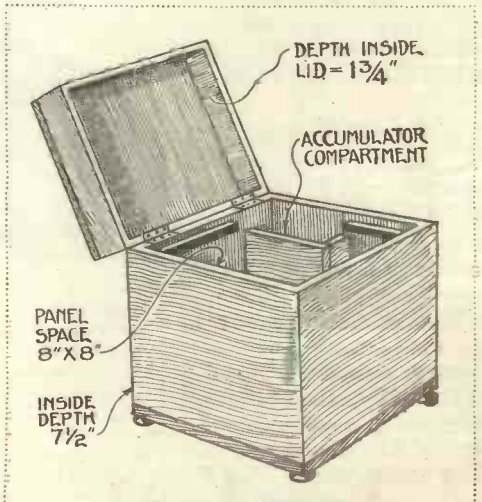
Since the successful operation of this unit depends on the excellence of the valve, it is worth while spending money on a good one. This means that you must buy one from the reliable British makers only.

The valve used in this set is an Osram DE7. It is a dull-emitter general-purpose four-electrode valve, works off a 2-volt accumulator and takes .4 ampere filament current. The makers state that an anode battery of 6 to 15 volts may be used on it; we ourselves have used up to 24 with gratifying results. The filament is undoubtedly strong and has successfully withstood accidental falls to the ground.

The circuit is shown diagrammatically in Fig. 1. Here L_1C_2 is the tuned oscillatory circuit which sets up the oscillations. It is connected on one side to the two grids of the valve—by a direct wire to the inner grid and *via* the grid condenser C_1 to the outer grid. On the other side it is connected through T_1T_2 to the anode battery, marked H.T.

The condenser C_1, of .0002 microfarad capacity, prevents the outer grid from being subjected to the voltage of the anode battery and also functions in the usual way as a grid condenser. The grid leak R_1, of 2 megohms resistance, is connected as in the case of three-electrode valves to the filament as shown.

Four terminals, $T_1T_2T_3T_4$, are shown—T_1T_2 being connected by a



Details of Cabinet.

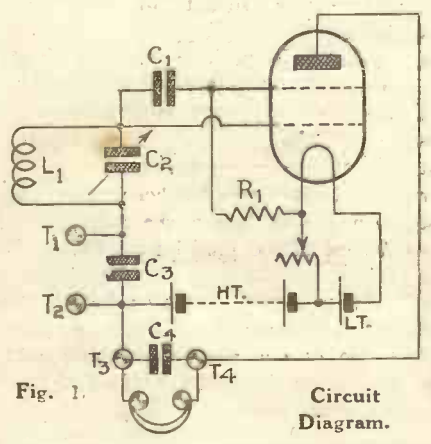


Fig. 1. Circuit Diagram.

shorting strap on the outside of the set, and T_3T_4 serving as connections for phones. Across T_1T_2 is a condenser C_3 of .01 microfarad capacity and across the phone terminals a condenser C_4 of .0075 microfarad capacity is placed.

A 2-volt accumulator is provided for filament-heating purposes, regulation being obtained by the filament rheostat R_2.

In the actual instrument, instead of using a single coil L1 as shown in the diagram, three plug-in coils of different sizes are used to get different wavelength ranges. For a simple C.W. wavemeter, the terminals T_1T_2 and condenser C3 could have been omitted, but it was thought advisable to include these so that the instrument could be used for other purposes.

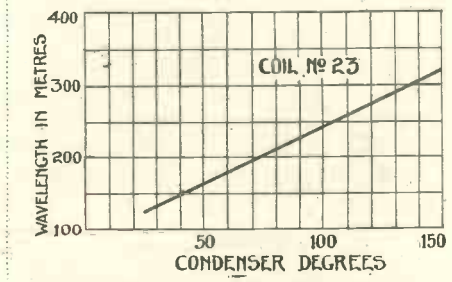


Fig. 2.—Example of Wavelength Chart.

By connecting T_1 to T_2 and a pair of phones to T_3T_4, as shown in Fig. 1, the instrument becomes a simple heterodyne wavemeter, capable of sending or receiving C.W. signals.

If T_3T_4 be shorted together by a connecting strip and the phones put in place of the strap across T_1 and T_2, then the phones and condenser C_3 constitute a note-frequency circuit, and the valve sets up high-frequency oscillations modulated by oscillations set up in this note-frequency circuit. The apparatus thus becomes a buzzer or tonic-train wavemeter.

Or again, if the phones be connected to terminals T_3 and T_4, as in the first case, and a coil of large inductance put in place of the short-circuiting strap across T_1 and T_2, the unit will work as an Armstrong super-regenerative receiver, and the set can be used for ordinary reception purposes.

Three Uses

Summing up then, we can use the circuit shown to give us (1) a heterodyne wavemeter, (2) a buzzer wavemeter, or (3) an Armstrong super-regenerative receiver.

It will be appreciated, also, that no reaction coil is used to produce oscillations. This means that the ordinary plug-in coils used for reception can be used, which is very convenient and economical for the set-builder.

Simply explained, the functioning of the circuit shown in Fig. 1 is as follows:

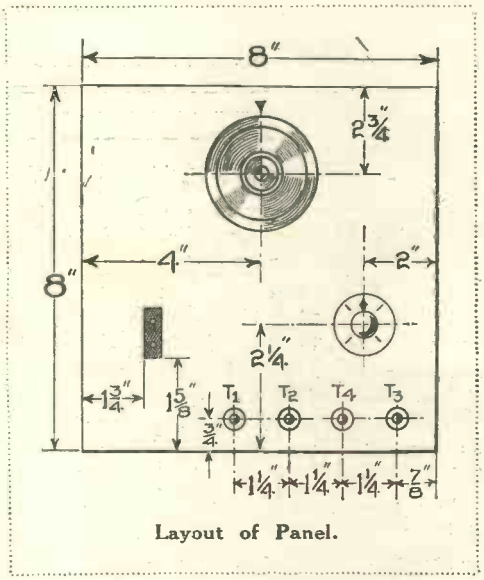
Any voltages set up in the oscillatory circuit L_1 C_2 are impressed on the inner grid and also on the outer grid through the grid condenser C_1.

Now the operation of a four-electrode valve is such that if a negative voltage be impressed on the outer grid with respect to the filament, then the electron or negative current flowing from the filament to the inner grid increases.

If, therefore, a small negative charge accumulates on the plate of condenser C_2 connected to the grids, then the effect of the charge on the outer grid is to cause a negative electron current to flow from the inner grid to the condenser and make it more negative still.

This voltage will increase until the inner grid-filament current is at its maximum. The circuit L_1C_2, however, is an oscillatory one, so that we shall have oscillations set up instead of the condenser remaining permanently charged.

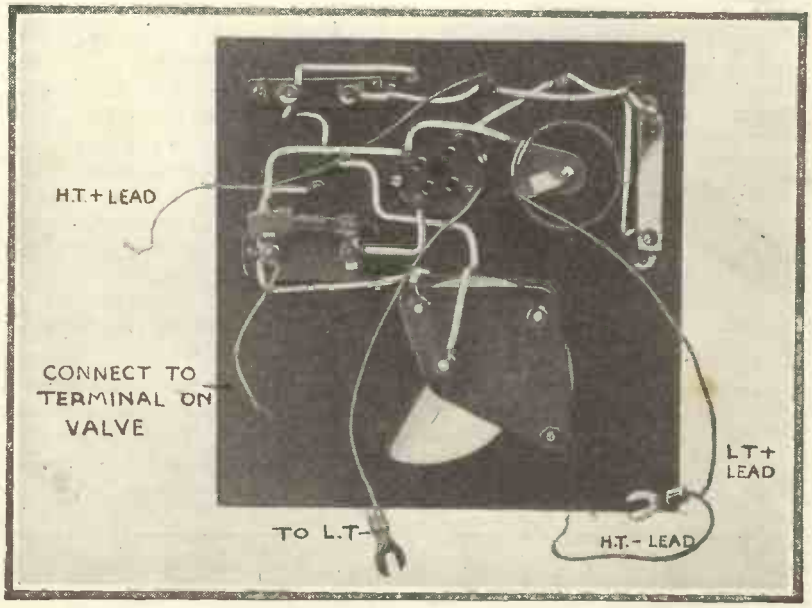
This is not the complete story of what happens, but it is sufficient to help the beginner to understand why the valve sets up oscillations when the circuit shows neither reaction inductance nor condenser as provided in the usual three-electrode valve circuits.



Layout of Panel.

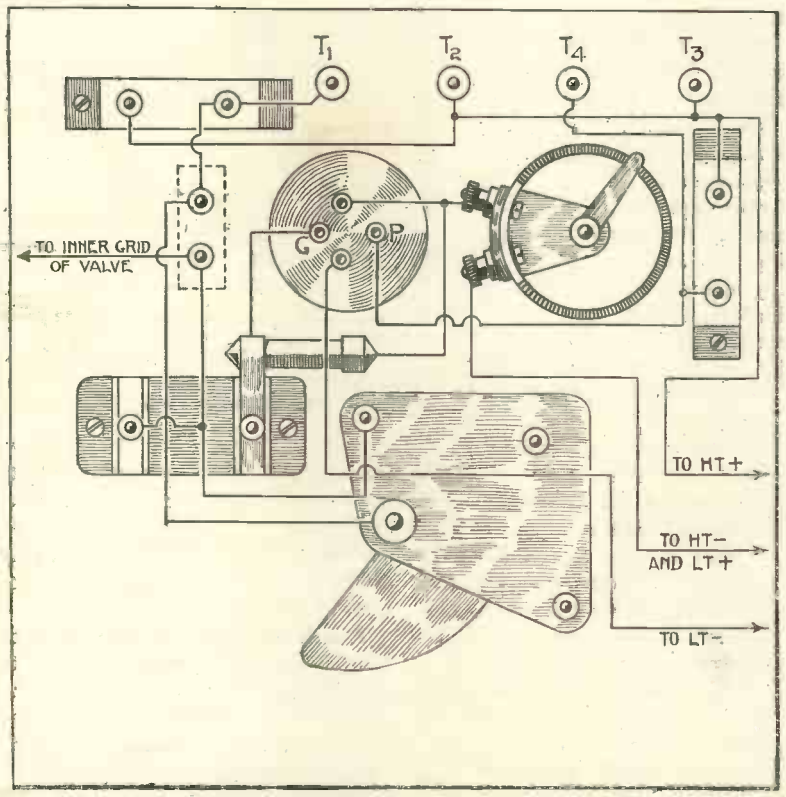
Components Required

To make up the set the following components are required. Whilst the names of the actual components are



Photograph showing Connections of the Combined Wavemeter and Armstrong Receiver Unit.

A Combined Wavemeter & Armstrong Receiver *(Continued)*



Wiring Diagram of the Combined Wavemeter and Armstrong Receiver.

given, it should be understood that good equivalent makes can be substituted :—

Ebonite panel, 8in. by 8in. by ¼in. (Becol or Trelleborgs, Radion.)
Box or cabinet for same, 6½in. deep.
Four 6 B.A. terminals. (Economic.)
Plug-type coil holder. (Economic or Burne-Jones.)
5-ohm filament rheostat. (Peerless Junior or Ericsson.)
.0005-microfarad square-law variable condenser. (G.E.C., or Ormond.)
Valve holder. (Magnum or Athol.)
.01-microfarad Mansbridge type condenser. (T.C.C. or Dubilier.)
.0075-microfarad fixed condenser. (Dubilier or Igranic-Pacent.)
.0002-microfarad fixed condenser. (Dubilier or Mullard.)
2-megohm grid leak. (Dubilier or Mullard.)
6 flashlamp batteries, 4½ volts each.
One 2-volt cell, 4½in. by 3½in. by 1½in. (C.A.V.)
One No. 23 coil. (Blackadda.)
One 9-turn coil. (Blackadda.)
One 4-turn coil. (Blackadda.)

Preparing the Panel

The first step is to see that the ebonite panel is correctly sized and finished off. If ebonite of the makes recommended is used there is no need to worry about surface leakage.

If you are not sure about the ebonite you use, it is safer to remove the surface and thus ensure that the conducting skin sometimes left from the mould cannot cause trouble.

A good way to do this is to rub the ebonite vigorously with emery-paper and ordinary metal-polishing paste.

Wiring can be done with square-section wire or preferably with No. 20-gauge copper wire. In the actual set made in the WIRELESS MAGAZINE workshop No. 20-gauge tinned-copper wire was used, each length of wire being run in systoflex sleeving.

It will be noticed in Fig. 1 that the grid leak is connected to one end only of the grid condenser, the other end being joined to the filament. In wiring, therefore, one end of the grid leak is pushed into its metal clip and the other end must be held by the remaining clip, but insulated from it.

This is done by inserting a piece of oiled silk or waxed paper between the condenser clip and the grid leak, the connection to the grid leak being made by twisting a wire round the metal end of the grid leak before pushing into the insulated condenser clip.

Flattened Wire

The end of this piece of wire should be flattened out by hammering before twisting it round the leak; otherwise it may be found difficult to push the leak home.

A length of insulated wire about 3½ in. long is provided for connecting the inner grid (which is made off to the valve metal cap by a terminal) to the right-hand terminal of the grid condenser shown in the panel wiring diagram.

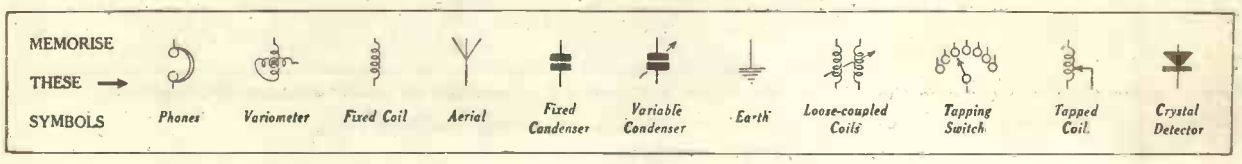
Three flexible insulated wires are shown in this diagram for connection to the batteries, which are contained in the case.

To calibrate the wavemeter it is necessary to have a valve receiver capable of receiving a broadcasting station of known wavelength and also a valve circuit capable of generating oscillations over the range of the wavemeter, namely, 20 to 400 metres. If two people build the wavemeter as described then calibration is an easy and straightforward matter.

Preliminary Adjustments

As a preliminary, insert the smallest coil (4-turn) and have the variable condenser adjusted to 160 degrees; increase the filament current until a sharp click is heard in the phones.

At this setting of the filament rheo-



Designed by Sydney Brydon, D.Sc.

stat the valve should be capable of generating oscillations over the condenser range with each of the other coils. Now insert coil No. 23 in each wavemeter.

In an actual calibration the following method proved satisfactory: An oscillating valve receiver was tuned-in to 2LO (an aerial was *not* used), so that the heterodyne beat note was below audibility. The two wavemeters, each using a coil No. 23, were adjusted till the receiver oscillations were heterodyned and heard in the wavemeter phones.

The wavemeter condensers were then carefully adjusted for zero beat with the receiver. The condenser settings on the wavemeters then corresponded to 2LO's wavelength—365 metres. This occurred at 167 degrees on No. 2 wavemeter condenser.

No. 1 wavemeter was then left untouched and the condenser of No. 2 wavemeter reduced slowly until another heterodyne note was obtained. This occurred at 73 degrees and corresponded to the second harmonic of the 365-metre wave generated by No. 1, namely, 182.5 metres.

On reducing No. 2 condenser still further, another heterodyne at 24 degrees was obtained. This was the third harmonic of 365 metres, namely, $\frac{365}{3} = 121.66$ metres.

These results were plotted as in Fig. 2, which gives a calibration chart for wavelengths obtained when using coil No. 23.

To get the next range of wavelength calibrated on No. 2 wavemeter, the condenser in No. 1 was reduced until a strong heterodyne note was obtained on the phones with No. 2 adjusted to 24 degrees. In other words, the wavemeter No. 1 was adjusted till it radiated 121.66 metres.

The 11-turn coil was then inserted in place of No. 23 in wavemeter No. 2 and the condenser adjusted for three heterodyne notes as before. These occurred at 162 degrees, 72 degrees and 30 degrees, corresponding to wavelengths of 121.66, 60.83, and 40.41 metres (that is, fundamental, second and third harmonics).

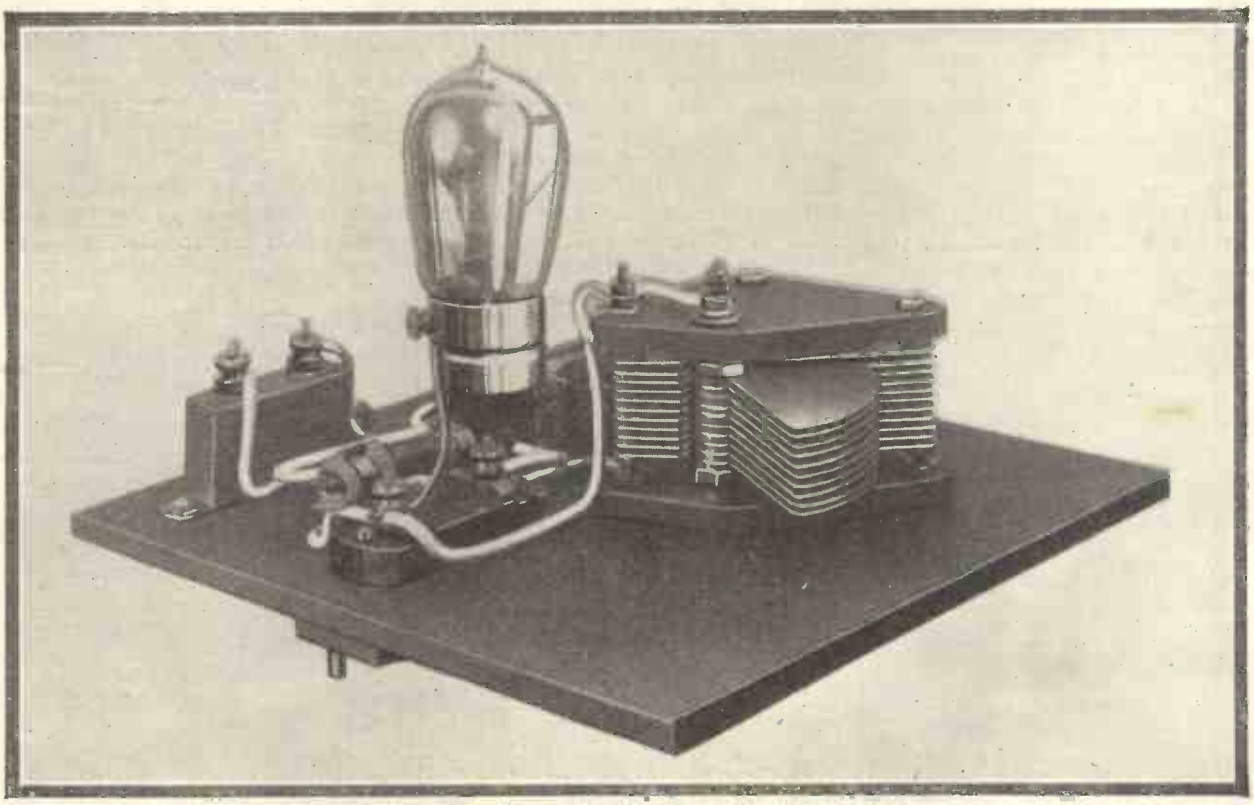
By now adjusting No. 1 wavemeter to 60.83 metres in the manner as described above No. 2 wavemeter can be calibrated for 60.83, 30.4 and 20.27 metres. Since a square-law condenser is used, a line can be drawn through the points plotted as in Fig. 2 and a good calibration wave obtained for each range.

Buzzer Wavemeter

If a buzzer wavemeter is required then connect the phones to terminals T_1T_2 and short-circuit T_3 to T_4. If the filament rheostat be reduced slowly, then at a certain point a click is heard in the phones, denoting the starting point of oscillations. On slightly further reducing the filament resistance a loud humming note is heard in the phones.

At this point the valve is generating tonic-train signals. A slight readjustment of the filament resistance will be necessary for different coils and condenser settings.

[*The use of the wavemeter as a super-regenerative receiver will be described later.*]



Another Photograph of the Combined Wavemeter and Armstrong Receiver.

VOICES OF THE NIGHT!

Under this title we shall publish from time to time chatty articles on those foreign announcers who are by now almost as familiar to British listeners as are the B.B.C.'s announcers.

This month we are giving brief accounts of three announcers—those at the Brussels, Barcelona and Frankfort-on-Main broadcasting stations.

RADIO BARCELONA, Oslo, Paris, Hilversum, Brussels, Berlin! Familiar friends in the ether, whose calls are nightly conveyed to our ears. Who are they? What are they?

Characteristics

By their expressions, their styles of delivery, their unseen mannerisms, these invisible announcers aptly depict the characteristics of the countries in which they live. Would it not be of interest to know to whom all these strange voices belong?

Monsieur Leopold Bracony (Brussels): His sonorous "Allo! Allo!" you will have heard whenever you have tuned-in to Radio Belgique; he fulfils not only the duty of announcer at the Brussels studio, but, to a great degree, is responsible for the organisation of its excellent programmes.

Monsieur Bracony, as you may have noticed, possesses a deep baritone voice, and your knowledge of French must be either very scanty or non-existent if you cannot understand every single word of his announcements.

He has been a vocalist since the early age of seventeen years, when he began to study music for the purposes of the stage. He was, as a matter of fact, a pupil of Jean de Reszke, and has filled many important operatic parts in Paris, Brussels, and other European capitals.

On one occasion, as a member of a touring company in Rumania, he was stranded in that country, the impresario having decamped with the till!

At the Brussels station he undertakes the production of all operatic performances in which, as a rule, he takes the leading baritone *rôle*. He is proud of his studio, and gives out its call between each item. His politeness vies only with that of his Paris *confrère*, Radiolo, in his final announcement: "La soirée est terminée. Bon soir, mesdames; bon soir, mesdemoiselles; bon soir, messieurs," at the end of the evening transmission.

Señor José Torres (Radio Barcelona, EAJ1): Most listeners who have picked up these transmissions, although perhaps ignorant of the Spanish language, will have realised that the announcements made between the items are not merely bald statements of the song or speech to be broadcast. No, José Torres (Toresky), the speaker of Radio Barcelona, is not a mere announcer—he is an actor of repute with thirty-five years' experience of drama, comedy, and operetta, in all of which he has played leading *rôles*.

Broadcast Publicity

Similar to other Spanish stations, Barcelona is entirely dependent for income on whatever monies can be extracted from local commercial firms for broadcast publicity, and it is left

Señor José Torres, of Barcelona.

Mons. Leopold Bracony, of Brussels.

The Voice of Frankfort-on-Main

to Torres, when in charge of the studio, to "gild the pill" (his own words!) and to make these advertisements palatable to the listening public.

For this reason, between each item, he draws upon his vast collection of stage gags, cracks jokes, and tells a few anecdotes, amongst which he cunningly slips in a reference to the business house which is paying for a boost.

His witty comments apparently appeal to the Spanish listener, for when he is at the microphone, although it may be felt that he is keeping the word "Publicity" in his mind's eye, it is seldom that the Barcelona fan switches off his receiver.

"My difficulty," said Torres to me, "is to improvise new jokes daily, and in my opinion such a thing is only possible to an experienced actor who for many years has held his audience by improvisations."

Señor José Torres is an asset to a broadcasting station; he is a fluent speaker in five languages.

Herr O. W. Studtmann (Suedwestdeutsche Rundfunkdienst): Now that the new Frankfort-on-Main high-power station is in full operation, its transmissions are picked up in most parts of the United Kingdom, and many of you will have heard the voice of its announcer.

Herr Studtmann, who is only in his twenty-sixth year, studied medicine at the Hanover and Freiburg Universities with a view to taking over his father's practice, but during this period, in order to supplement his income, he also acted as assistant manager of one of the local theatres.

The stage strongly appealed to his artistic temperament, and during his subsequent visits to the Munich and Berlin Universities he devoted a goodly portion of his time to the study of dramatic production.

Most of the Continental broadcasting studios consider that a knowledge of stage-craft is an essential adjunct to an announcer's qualifications, and in 1924 he was offered a responsible position at the Frankfort studio.

"My technical and artistic experiences," he said, "have been of considerable value to me in the composition of the daily programmes."

Herr O. W. Studtmann.

Herr Studtmann compels your attention by the exceptional clarity of his enunciation; the explanation lies in the fact that he was born and educated at Hanover, a city of the Fatherland which prides itself on its pure German.

J. Godchaux Abrahams.

PLATITUDES!

DO you know that the two words, *plate* and *platitude*, come from the same source, the French word, *plat*, meaning flat, dull, insipid, pointless, shallow, empty, or anything else you like of that kind of thing?

I have just looked the two words up in my dictionary, so I happen to be fully acquainted with their origin for the time being.

You know all about wireless *plates*, of course, even if you should happen to call them *anodes*, but can you recognise a wireless platitude when you run across one? I assure you there are plenty of them about just now.

According to my big dictionary, a platitude is a dull or stupid remark. We should not be far wrong if we described a wireless platitude as an obvious statement of fact which has been repeated so often as to lose its point.

It would be a most interesting thing if we could compile and exchange lists of wireless platitudes which come under the above definition. I think we should all be somewhat surprised at the size of our lists.

My own particular pet aversion amongst wireless platitudes is the following:—

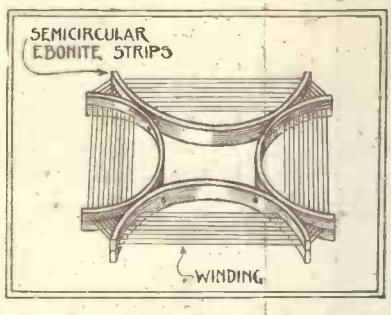
In spite of its name, wireless makes use of large quantities of wire.

Aerial.

GADGETS, HINTS & TIPS

Novel Low-loss Former

Simple and inexpensive to construct is the low-loss coil former shown in the sketch. It is made by cutting off four semi-circular strips from a thin-walled ebonite tube.

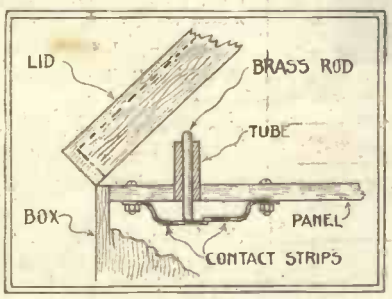


Novel Low-loss Former.

For a No. 40 or No. 50 coil, cut the strips from a 3in. diameter tube. Slots are cut in the strips as shown, and then the four semi-circles are bolted together, so forming an approximately rectangular former on which is wound the required number of turns of wire.

Automatic Lid Switch

Now that many dull-emitter valves show an almost imperceptible glow,



Automatic Lid Switch.

it often happens that when one has finished listening to the broadcast programme one forgets to switch off the L.T. current, because there is no bright glow from the filaments to act as a reminder. Shown in the sketch is an ingenious method whereby the act of cutting off the L.T. supply is rendered automatic. Two small strips of springy brass are mounted beneath the panel so that they are in contact. Immediately above them is arranged a short length of brass rod, which is free to slide inside a slightly shorter length of ebonite tubing. This ebonite tube should be the same height above the panel as is the top of the cabinet lid, so that when the lid is closed the projecting brass rod is pushed down slightly, which causes the two contact strips to break contact. If, then, these two brass contact strips are connected in series with one of the L.T. leads it is clear that the act of shutting the lid breaks the L.T. circuit.

J. B.

Position of Series Condensers

Amateurs sometimes find difficulty in deciding where to connect the series condenser—in the earth lead or in series with the aerial wire.

As regards signal strength there is little to choose between the two methods, but for ease of operation the second named method is to be preferred.

If placed in the earth lead, the series condenser insulates the set and batteries from earth, and undesirable body-capacity effects are noticed when operating the set. When placed in series with the aerial care should be taken to connect the fixed plates to the aerial terminal, otherwise hand-capacity effects will again be experienced. Never use a series condenser of a value below 0.0005 microfarad.

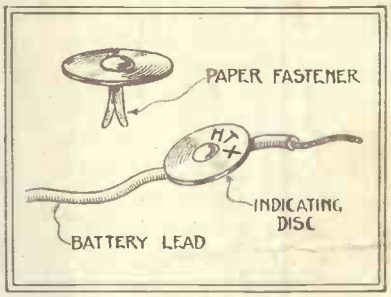
M. A. K.

Novel Battery-lead Indicators

Mistakes in battery-lead connections often lead to disastrous results, such as burnt-out valve filaments, so the hint illustrated in the sketch will prove a useful preventive.

Ordinary circular panel indicators are secured to the ends of the leads by first slipping a paper fastener through the hole in the indicator, and then pressing the fastener securely to the lead.

R. T. B.

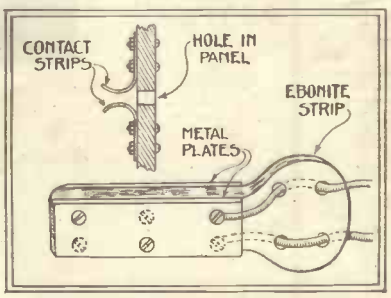


Novel Battery-lead Indicator.

Simple Phone Plug and Jack

Shown in the sketch is a simple home-made phone or loud-speaker plug and jack. The jack consists of two pieces of shaped springy brass, and the plug is simply constructed from a piece of ebonite strip, to two opposite sides of which are screwed metal plates.

These in turn are connected to the phone or loud-speaker leads so that when the plug is inserted in the rectangular hole cut in the ebonite panel, contact is made by the metal plates pressing against the shaped contact strips mounted under the panel.



Simple Phone Plug and Jack.

B. M. P.

WIRELESS CONTROL

Past :: Present :: Future

By Major RAYMOND PHILLIPS

Major Raymond Phillips operating his latest wireless-controlled model railway.

THE wireless control and operation of mechanism opens up a field with such vast possibilities that it seems astonishing the subject appears to be so little understood by amateurs. The problem has occupied the attention of scientists for many years, and there is a rich harvest in store for the successful experimenter.

Sixteen Years Ago

When the author introduced his wireless-controlled airship sixteen years ago aviation was in its infancy and wireless was not understood as it is to-day. About three years ago it was announced in the Press that a battleship had been controlled, and operated, by wireless.

Numerous experiments have also been conducted in connection with the wireless control of torpedoes and other craft. The records of the Patent Office afford ample evidence of the time and money that have been lavished in that direction.

The great difficulty with all systems of wireless control appears to be the fact that so far nobody has succeeded in solving the all-important problem of jamming. Tuning is only satisfactory providing that no other station is transmitting on the same wavelength as that on which signals are being received.

In warfare, unfortunately, no attention appears to be paid to international conventions or agreements, consequently (so far as our present knowledge guides us) there would always be the risk of one or more stations transmitting signals on the same wavelength, and so upsetting the wireless control of mechanism from another transmitting station.

During the Great War jamming was freely indulged in, and about three years after the cessation of hostilities the author inspected a portable transmitter which had been used by one of the opposing forces; it was arranged to transmit signals on varying wavelengths.

During 1911-12 the author invented a system of "direct selection," the transmitting and receiving apparatus being fitted with continuously revolving synchronised drums. The latter were fitted with contact pins in a spiral form and, with a complicated relay system, it was arranged that synchronously with a transmitted wireless wave selected circuits were instantly closed in the receiving apparatus and remained in that condition until the cessation of electric oscillations in the transmitting apparatus.

Another secret device (also invented by the author) caused the wavelength to be automatically varied in the transmitting apparatus and the receiver synchronised as desired. The system thus permitted the control of a large number of circuits either on a fixed or variable wavelength.

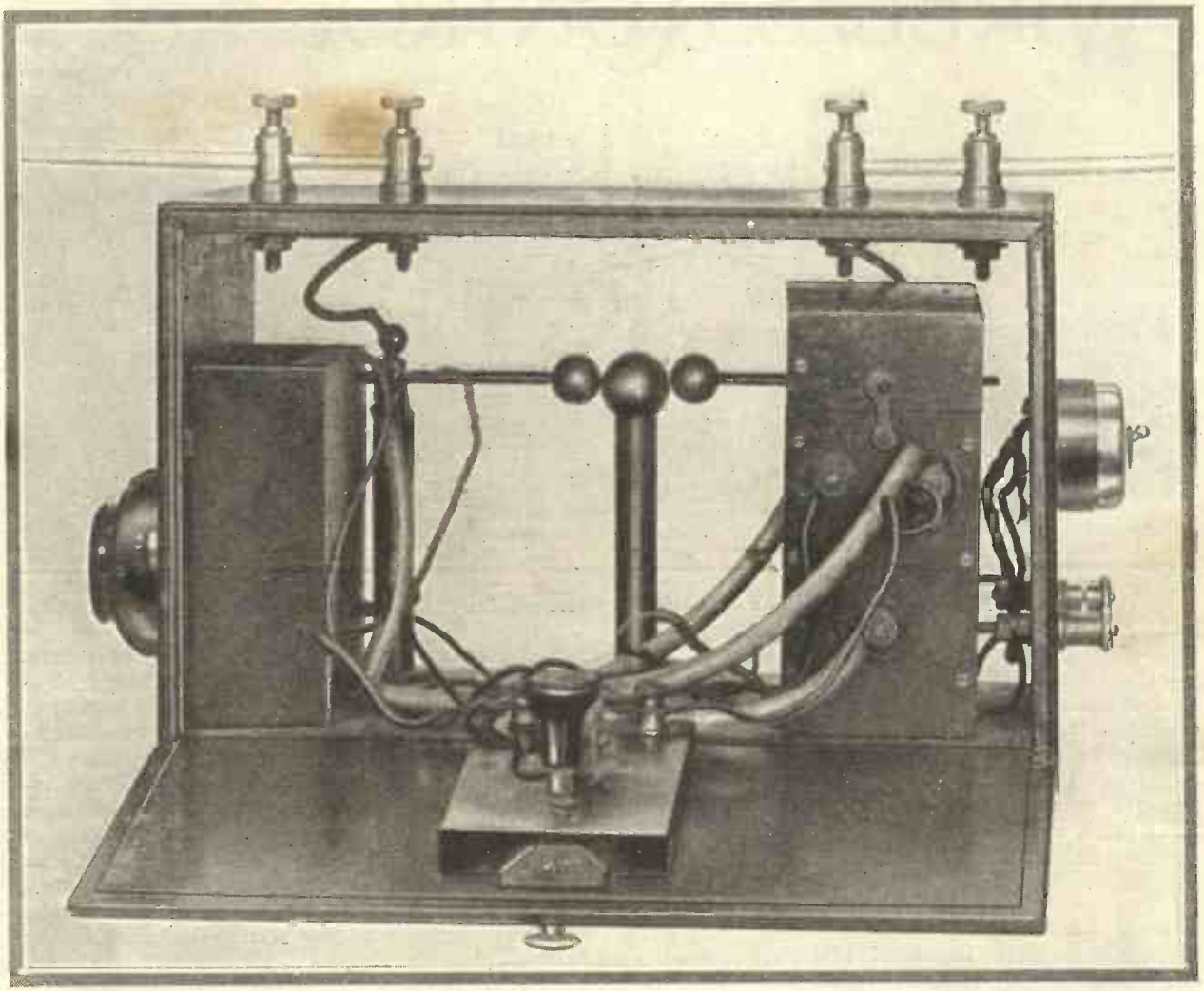
A certain measure of success attended the experiment, and although the risk of jamming was reduced to fine limits the system did not render wireless-controlled craft, etc., absolutely immune from interference by other transmitting stations. Two key diagrams of the experimental circuits are shown; these are self-explanatory.

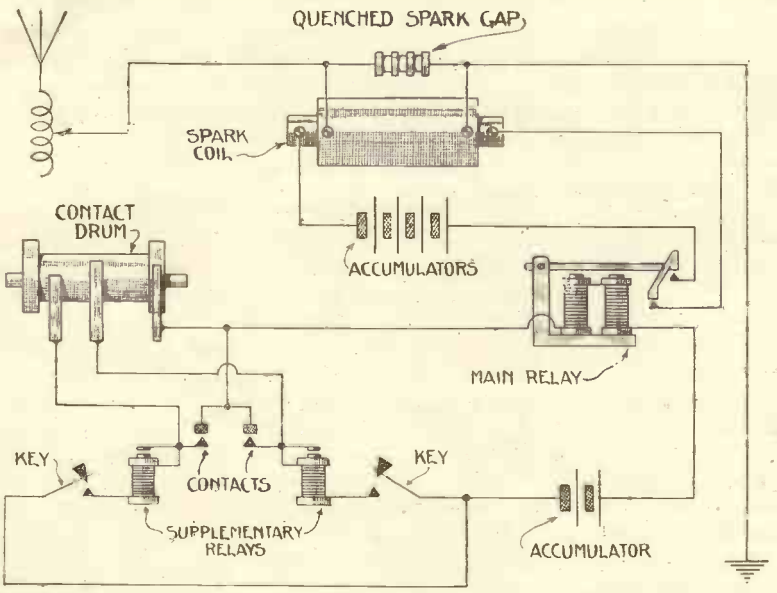
It will be observed that a coherer is fitted in the receiving instrument as a detector of the electrical oscillations radiated from the transmitting apparatus.

Coherer Detectors

Coherers were used as detectors in the very early days of wireless telegraphy, but of course are now obsolete for that purpose, and although the author some time ago succeeded in constructing one for the reception of wireless telephony, the adjustment of the device involved so much trouble that as a commercial article it would probably have been useless. The clearness of reception (when the device was in use) was admitted to be remarkable by many experts who witnessed the tests.

Wireless Control *(Continued)*





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(*Above*).—Experimental Transmitter used for Wireless Control by the Author.

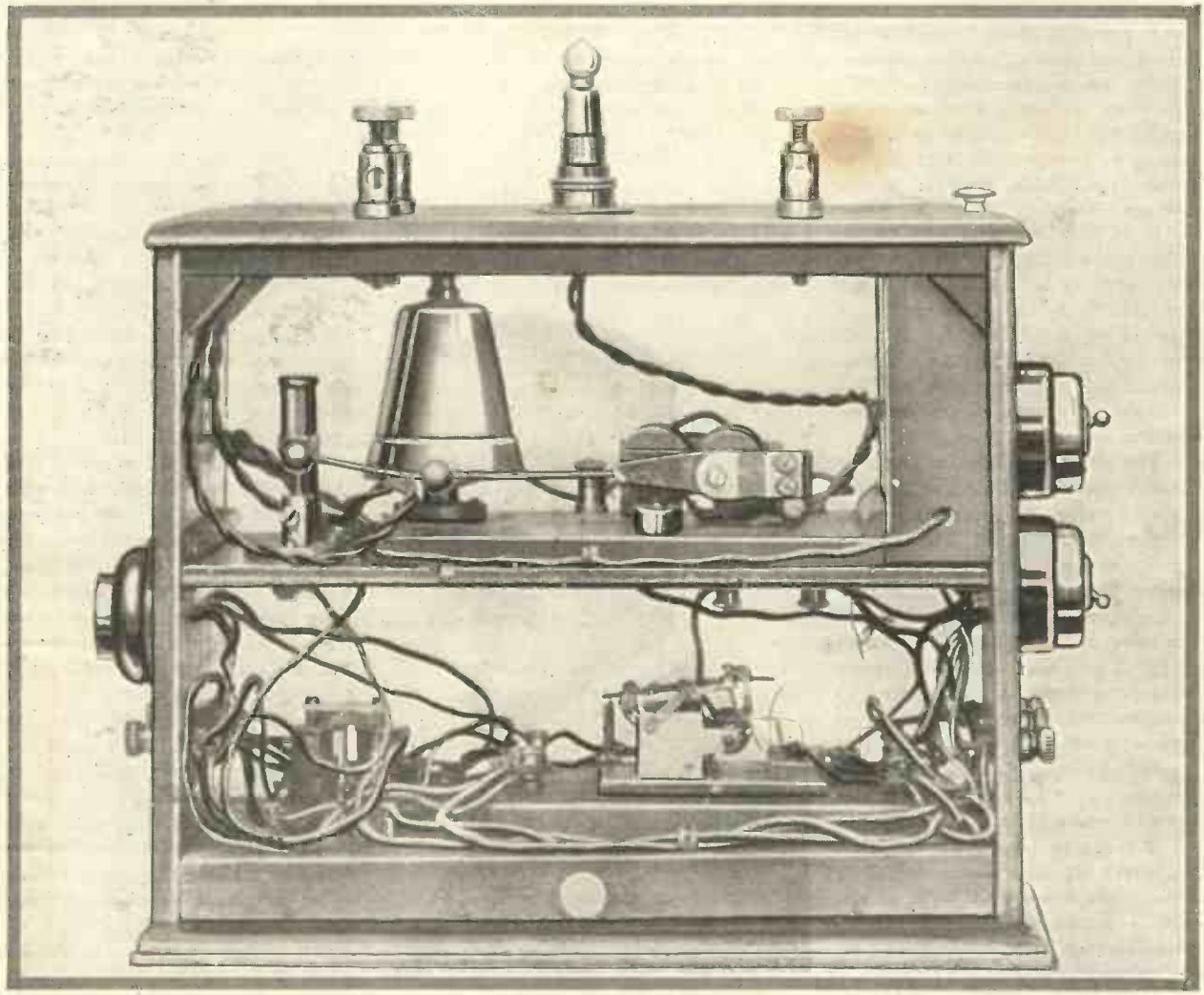
(*Left*).—Circuit Diagram of Transmitter.

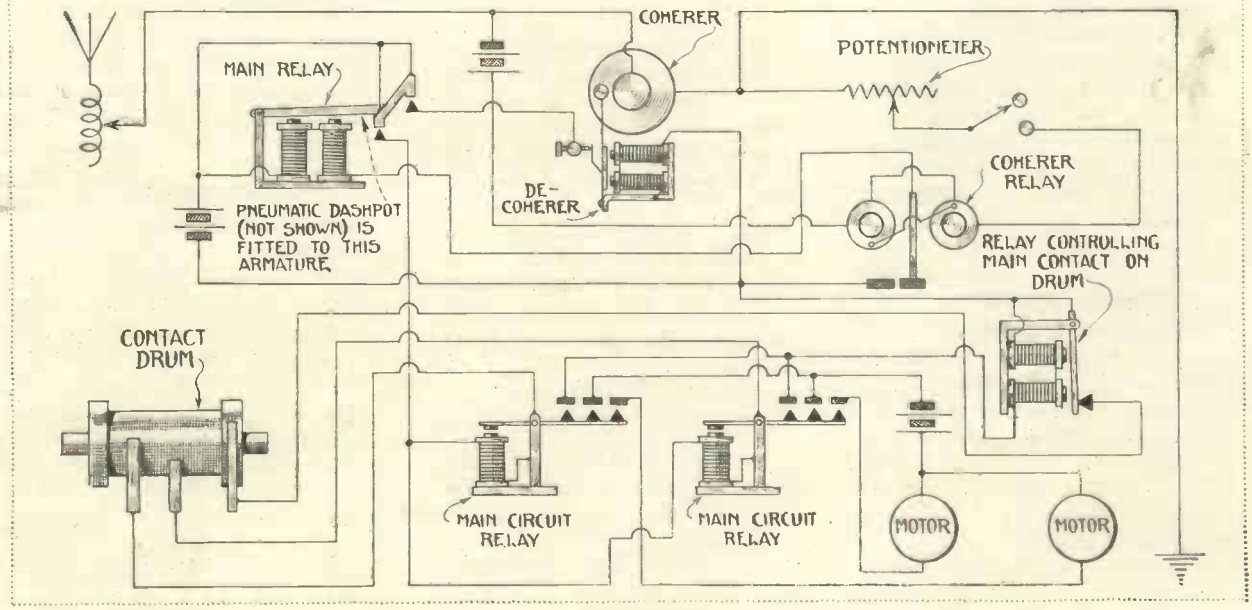
(*Opposite page: right, above*).—Experimental Receiver used for Wireless Control by the Author.

(*Opposite page: right*).—Circuit Diagram of Receiver.

□ □ □

By Major Raymond Phillips





Wireless Control *(Continued)*

For the wireless control of torpedoes and similar craft a coherer appears to possess many advantages over other forms of detector, as it must not be overlooked that effective control of such craft is at present only practicable over a visible range.

It is very necessary to ensure that receiving apparatus for wireless control should be absolutely reliable in its action, as no adjustments are possible to such apparatus in (say, for example) a wireless-controlled torpedo which has left the vicinity of a transmitting station.

The author is of the opinion that for short-range wireless control the use of valves as detectors or amplifiers introduces unnecessary and undesirable complications, more especially when one considers the risk of a valve filament burning-out at a critical period of control and thus rendering receiving apparatus unresponsive to transmitted signals. Such a contingency might not only be very serious but could lead to disastrous results if an airship or similar craft became involved.

It seems remarkable that coherers are so seldom referred to nowadays when that form of detector is acknowledged to be so suitable for certain problems of wireless control.

A spark transmitter fitted with a quenched-spark gap is a type of instrument which is very suitable for short-range wireless control, but even with all the latest improvements in transmitting and receiving apparatus there still remains the problem of jamming to be solved.

At several exhibitions in London and the Provinces the author has exhibited model trains, boats, etc., controlled by wireless, and although such experiments have attracted and interested crowds of people many imagine that in the near future wireless control will be adopted in connection with transport generally, thus entirely losing sight of the fact that at present it is possible to control only a source of energy by that means.

If and when it is ever possible and practicable actually to transmit energy over any distance by wireless, an entirely different problem from that which exists to-day will arise.

Numerous attempts have already been made in connection with wireless transmission of energy, but so far the experiments have been attended with little success, and any transmission has been possible only with an impracticable expenditure of electrical energy at the transmitting end of the power-supply system.

A well-known scientist has already accidentally succeeded in burning-out the armatures of generators in a power station over a distance of twelve miles by transmitting powerful high-frequency currents. In this instance the windings of the armatures in question appear to form the elements of a coherer, or imperfect contact detector, so that in those circumstances it would not be difficult to break down the insulation of the windings, and thus short-circuit them whilst they are conducting electric currents at probably a high E.M.F.

Some time ago it was announced that aeroplanes in flight had been put out of action by some mysterious means. The report probably originated from the Continent, where at that time experiments were being conducted with a view to ascertaining the effect of powerful high-frequency currents on magnetos fitted to motor cars.

Within limits it would undoubtedly be possible to short-circuit the usual condenser fitted to a magneto-ignition device by means of high-frequency currents, and perhaps derange the timing of the firing of a charge in the cylinders of an internal-combustion engine, thus putting the latter out of action. Such a method could be referred to as another form of wireless control, although the control in this instance would be merely a destructive agency.

From time to time other epoch-making discoveries are announced, many inventors claiming to have discovered methods of producing mysterious rays of an entirely new order, or new methods of transmitting wireless waves, which may be arranged to have destructive properties or used for peaceful purposes. Some "discoveries" appear to be announced at almost regular intervals, very much as is the arrival of the proverbial "sea serpent."

Looking at the facts as they are to-day, it will be apparent that there is a tremendous amount of research work ahead before wireless control becomes a serious factor in warfare. It is of paramount importance that the problem of jam-

Major RAYMOND PHILLIPS

In 1903 Major Raymond Phillips invented a system of automatic train control and in 1904 began to carry out experiments in the wireless control of mechanism. He progressed so far that by 1910 he had invented and patented a system for controlling airships by wireless; for the first time he steered and manœuvred an airship by wireless in a theatre. In 1911-12 he invented a system of "direct selection," which was successfully applied to wireless-controlled pianos and other musical instruments.

By Major Raymond Phillips

ming should be solved. Its solution would undoubtedly open up a new era in wireless, whether the latter is used for telegraphic or control purposes. Even with a beam system of transmission and reception there is no protection at present against jamming.

Commercial Purposes

For commercial purposes wireless control is distinctly useful. For instance, wireless foghorns and call-bells on lightships are already working satisfactorily. The risk of interference here is remote simply because the authorities are very strict in regard to wavelengths used by transmitting stations.

In the apparatus referred to, valves are fitted in the receiving instruments and delicate relays arranged to operate the various mechanisms involved. The risk of a valve filament burning-out at a critical period of control does not arise, as in the case of a lightship there is always some person on board; as regards a wireless-controlled foghorn, the matter should be attended to without delay.

The author has for some time been experimenting with a form of wireless signalling for railways, and has succeeded in obtaining selectivity within a radius of 20 feet, the idea being to separate up- and down-line signals, but the risk of atmospherics (which sometimes take the form of powerful static discharges) has to be considered, and with such an important thing as railway signalling all apparatus must be absolutely reliable in its action.

With a system of electro-mechanical automatic train control, invented by the author in 1903, a visual and audible signal was provided in the cab of a locomotive. This system proved satisfactory in use and was favourably commented upon by experts. It was successfully adopted on an American railway, but was not taken up in this country as at that time so many railway companies had running powers over each other's lines that an attachment on a locomotive and the permanent way proved an obstacle to getting all the various companies to agree to the expense of installation.

Now that railways in this country are grouped and only four big companies exist, there would probably be a possibility of the adoption of a simple, reliable, inexpensive, and efficient wireless signalling device. The author has often been asked by wireless enthusiasts if it would be possible to control a steam locomotive by wireless, and his reply has been as a stunt "Yes," but for practical purposes "No."

Even as a stunt it would be necessary to have a driver and fireman on the footplate of a locomotive if the value of the latter were to be considered.

It would not be a difficult matter to construct apparatus to apply the brakes of a train by means of wireless control, as it would simply involve the radio control of a valve admitting or releasing air from the train-pipe of an automatic vacuum or Westinghouse brake system, as the case might be.

The author's experimental wireless signalling apparatus provides for the application of the brakes of a train in the event of the driver of the latter overrunning signals.

It may perhaps be as well to mention that it is necessary to exercise care in the application of the brakes of a train, otherwise there is a risk of fracturing the couplings between the coaches owing to the great strain involved when the latter are brought to a standstill.

No Difficulties

The actual wireless control of an electric train presents no difficulties, but here again the jamming problem exists, and a question experts might naturally ask would be why control by wireless when through the medium of switch gear (the latter operated by man power) the main source of electrical energy can be so easily controlled?

The reply would, of course, be definite if the problem of wireless transmission of electrical energy had been solved.

It will be apparent that (so far as present knowledge is concerned) to control an electric train by wireless simply means that wireless apparatus is arranged to control a source of electrical energy in the form of storage batteries carried on the train itself, or the usual modern method of electrical energy supplied through the medium of a third rail or overhead conductor.

Having now described various applications of wireless control, it will be realised that its possibilities cannot be overrated. Wireless enthusiasts who desire to start experimenting should at first use the simplest form of transmitting and receiving apparatus, instead of attempting the more advanced stages of wireless control.

Experimental Instrument

The photographs show the author's experimental transmitter and receiver, designed for a maximum range of 50 yards. The transmitter is exceedingly simple and comprises a spark gap, small induction coil, accumulator, morse key, and terminals in which are secured two metal rods to form an aerial. The receiver is equally simple, and comprises a coherer, de-cohering device, relay, selector, and various terminals. Four of the latter are for securing two metal rods to form an aerial. The others are for connecting up to various apparatus it is desired to control.

The instruments in question have been successfully used for controlling model trains, firing guns, etc. The latter feat is effected by controlling an electromagnet operating the trigger of a gun

A very interesting experiment is the wireless control of a model railway. There is no need to have an electric locomotive specially made for the purpose, as reliable models for working from a 4-volt accumulator or ordinary electric-light circuits can now be obtained at cheap rates.

The author's latest model railway controlled by wireless is shown in the heading photograph. The receiver is connected to the third and outer rails of the track, and controls a main source of electrical energy at an E.M.F. of 220 volts. The control is perfect at short range, even to the extent of carrying out miniature shunting operations.

It is hoped that this article will assist in stimulating wireless enthusiasts in their efforts with wireless-control experiments, as controlling mechanism by that means not only appears uncanny, but is fascinating in the extreme.

THAT ORGAN STUFF!

A Special Article by PEARKES WITHERS

QUITE a number of years ago—fourteen, to be precise—when Mr. Robert Courtneidge was about to produce the musical comedy called *The Mousme* at the Shaftesbury Theatre, he decided that as there was going to be a very sensational earthquake at the end of the second act it ought to be preceded by that terrifying rumble which introduces all the worst earthquakes in real life.

No Rumbles

But though there are ingenious little machines which reproduce, for stage purposes, a variety of sounds ranging from the singing of a lark to the whistling of the wind, and from the lap-lap of water on a still night at Southend—when the cockles are out and the tide is in—to the clatter of horses' hoofs on the hard high road, there is no machine that reproduces a really satisfactory subterranean rumble.

Mr. Courtneidge tried the "thunder sheet," which is a long sheet of tin fitted with a handle and suspended behind the scenes where the assistant stage manager can skake it as and when occasion arises till all the girls in the audience cling nervously to the boys who have paid for their seats.

But the rumble of thunder isn't a bit like the rumble which announces the imminent upset of Japanese tea-houses and temperaments.

Mr. Courtneidge was in despair when Mr. Conrad Tritschler, who is quite English in spite of his name, and who had devised all the scenery for *The Mousmé*, had a brain-wave. Recalling a juvenile visit to Durham Cathedral, he suggested the use of an organ!

Most of us who have been to church have noticed that the lowest notes of a great organ seem to shake the very building: Mr. Tritschler, as a boy of ten, had tried to rush out of Durham Cathedral because the organist played the bottom C and D♭ together, and he thought the whole building was going to fall on his small head.

So he suggested that an organ should be built for *The Mousmé*, consisting only of the two pipes which produce bottom C and D♭; and after the producer and the scenic artist had sat one morning in an otherwise empty city church while an organ builder toyed vigorously with the two all-important notes, thereby shaking the building (as it seemed) to its foundations, an "earthquake organ" was built and installed at the Shaftesbury Theatre. And the effect of that organ left nothing to be desired.

Now whenever I see the words "organ recital" in a B.B.C. programme I think of *The Mousmé* and of earthquakes. For the fact that the bottom C and D♭ of the great organ suggested death and destruction in the Shaftesbury Theatre proves pretty conclusively that such deep-seated sounds are not exactly suitable for wireless sets. If they make solid buildings quiver and quake what, I ask you, do they do to wavelengths?

Well, perhaps they don't do anything to wavelengths. As I have never met a wavelength face to face I don't really know. But I do know what some of that organ stuff does to my loud-speaker.

My Loud-speaker

It overtaxes its strength. It upsets its north pole and its south pole, and shakes its equator off its circumference, technically speaking, so that the Atlantic Ocean slops over into the Pacific and all the windings nearly come unwound!

Personally I never can understand how the bottom C and D♭, not to mention some of the noises of the open diapason, the tibia, and the heavy flue basses, ever came to be included in an organ—unless it was to enable a dud organist to smother his own mistakes.

We talk about "the music of the spheres," but there is no music in a seismic disturbance; and even if a Bach fugue *must* chase its own air up and down the keyboard there is no reason why it should descend into the bowels of the earth.

Getting a Thrill!

Of course, as a spectacle, I like to see an organist working overtime on three keyboards and nearly a hundred stops, while his feet patter up and down the woodwork of the pedal organ, releasing all sorts of dreadful sounds.

I should like to see his instrument fitted with a lot more gadgets so that he could use his teeth and his nose and the top of his head as well as his hands and feet.

For he reminds me—incongruously enough—of the one-man band who used to be such a familiar figure in the streets when I was young: only the one-man band was far more fully occupied, working bells with his head, pipes with his mouth, a big drum with his elbows, a triangle and a tambourine with his hands, and cymbals with his feet.

But as a musical instrument I feel that the great organ goes too far. It goes too far down and it goes too far up, and instead of being content to be just an organ it tries to be everything in the world from an orchestra to an earthquake.

The great organ is a musical in-

strument in spots, and some of its sounds suggest all that we imagine heavenly music to be; but at its extremities it simply provides torture for our ear-drums. And, after all, our ears are the organs that really matter most when it comes to music.

Improving the Organ

I maintain that the great organ would be an infinitely finer instrument if its bass notes started higher up the scale—just where real musical sound begins—and for wireless purposes there cannot be the slightest doubt that all the rough stuff ought to be cut right out.

The microphone may very cheerfully drink in all the little rustling sounds of a Surrey wood on a June night; it may tolerate the boom of Big Ben with equanimity and hardly an added vibration; but to expect the poor little thing to cope with rumbles and grumbles and fundamental reverberations which fall on our ears with disconcerting results even at close quarters is to expect far too much of it, even when it is fitted with a controlling device to prevent it from completely losing its way among the loud passages.

Some of the gentlemen who manipulate the organ on occasional Sunday afternoons put in far too much footwork, if they will pardon my saying so, and they are altogether too fond of sustained chords and of harmonies that wander into other harmonies through horrible discords.

They may play an organ remarkably well in the accepted way of playing an organ, but they play it far too *completely* for wireless purposes, because most of their efforts turn to mush in the microphone and emerge from the loud-speaker in the form of unhappy little tunes desperately trying to save themselves from drowning in a sea of obliterating bloob.

It must be a wonderful thing to have all the powers of Nature at one's feet, so to speak, and I know that if I were to be let loose on an organ I should fancy myself as a modern Samson and bring the building down about my ears by playing the very dickens on the 32-feet pipes.

But as a mere wireless enthusiast I feel that the organist who is broadcasting should think of his listeners' enjoyment as well as of his own—and sacrifice some of his to theirs.

For the organ, when suitably played, *can* be satisfactorily broadcast. There is an organ at the Regent Picture House, Brighton, which contains to my certain knowledge more than 2,400 pipes, some of which, if operated in combination would not merely make the pictures wobble on the screen, but would probably upset the soup in the neighbouring hotels and boarding-houses.

In fact, Mr. Terence Casey, who plays this organ, assures me that if he were to let himself go with the resultant bass and the open diapason he would probably give at least half of Brighton a thorough shaking.

But he doesn't do it. Why should he, when he can enchant the people who have paid to go into the Regent?—when he can play piccolo and saxophone and violoncello and string celeste and glockenspiel, and all sorts of other delightful things?

I have sat and listened to Mr. Casey playing a simple little comic affair like "Felix Kept on Walking" till he has made me laugh aloud with joy.

For instead of throwing Felix into a volcano, or swallowing him up in the flue basses, he made him walk all over the building in a score of different ways till you felt that the blessed cat had really got in among the works and was popping in and out of the pipes.

This is a very lowbrow example of what can be done on the organ, perhaps, but I am sure it would give infinitely more pleasure to a million listeners than, say, Handel's Concerto No. 4 in the throes of a tidal wave, or the Hallelujah Chorus running amok among the palpitating pedals.

Shepherd's Bush Pavilion

And I have no fault whatever to find with the organ stuff broadcast from the Shepherd's Bush Pavilion: indeed, in my ears it approaches the ideal, and but for the fact that I am not wearing it at the moment, I would take off my hat to Mr. Quentin M. Maclean, who is the organist there.

He is an artist in broadcasting, and I am more than sorry that the B.B.C. have cut out those Friday afternoon recitals of his in favour of orchestra and organ on Tuesday afternoons.

Mr. Maclean is very frank, too, for he confesses that when it comes to broadcasting the organ there is bound to be some slight "mushification" in any transmission. But he does his best to eliminate that mushification, and I think everyone will agree with me that he is very nearly successful.

He tells me that when first transmission from the Shepherd's Bush Pavilion was started it was found that certain tones caused "blasting."

"Mr. Compton, the builder of the organ," he says, "investigated the causes of this, in conjunction with the B.B.C. engineers, and found that the trouble was only present when certain ranks of pipes were used—among them the heavy basses. He very ingeniously rigged up a cut-out device (electrically worked) so that when broadcasting one simply brings into operation two switches which cut out the offending pipes.

Engineers' Responsibility

"The B.B.C. have, as you know, a device for reducing power during loud passages, and vice versa, 'controlling,' I believe it is called, which, to my mind, gives the engineers a large share of the responsibility for good transmission.

"I am in perfect agreement with your contention that the middle registers are best, but it is surprising how well the trebles of the flute and string stops come through.

"The 'voicing' of the Pavilion organ is peculiarly suitable for broadcasting, mainly on account of the absence of the 'mush' you complain of, which I might re-name 'indefinite muddy tone.' Each set of pipes has its own clear-cut and distinctive quality, and yet will blend perfectly with other pipes.

"I endeavour to infuse this clear-cut, precise quality also into the playing, perhaps even to exaggerate it slightly; and to avoid anything slipshod, or in the nature of 'meandering about.' As a rule I do not play heavy organ music of the sustained chord type, but this does not preclude 'classical' music. As a matter of fact I consider the Bach Trio Sonatas (three parts only throughout, no chords, and plenty of movement) ideal organ broadcasting pieces.

"On the tonal side, I try to keep everything as interesting as possible. I change the tone quality frequently, and above all avoid holding loud chords too long—or any chords, for that matter.

"Meticulously careful phrasing and strong rhythmic sense are also vital points in successful broadcasting."

The Music-lover's Three-valver

Specially designed, built and tested by the WIRELESS MAGAZINE Technical Staff

DEVELOPMENT in the design of wireless receivers is showing a tendency to follow along two separate lines, with the result that there are now two distinct types of receivers obtainable.

Essentially a family loud-speaker set, the Music-lover's Three-valver can be easily adapted for the reception of the local station or Daventry—not that its range is in any sense restricted to British broadcasting stations only, of course.

Under normal conditions it should be possible for even the unskilled operator to receive a number of Continental broadcasting stations on the loud-speaker.

The cost of the components for building this set (excluding valves, loud-speaker and batteries) is approximately £8

Number of Controls

One type is the super-sensitive multi-valver having several stages of balanced high-frequency amplification necessitating the use of several controls. The other type is the outcome of various attempts to produce a fairly sensitive receiver having the least possible number of controls.

This type of receiver is usually designated "the family set," thereby implying that the operation is simple enough to be managed by any non-technical person.

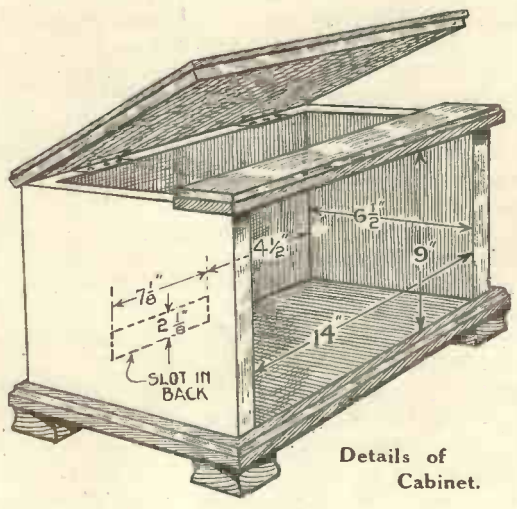
The set to be described in this article belongs to the latter type.

As will be readily seen from a glance at the photographs there are only two controls mounted on the panel, one for each hand. The loud-speaker is plugged into the jack mounted at the bottom of the panel, in the centre.

Simple to Operate

Now, although this set is very simple to operate, its efficiency is surprisingly high, and its quality of reproduction surpasses that of any set using transformer-coupled L.F. amplification. Indeed, it may aptly be described as the music-lover's receiver.

The superb tonal qualities are obtained by the use of a special low-frequency coupling between the second and last valves; a low-frequency choke is inserted in the plate circuit of the second valve and is coupled by the usual condenser to the grid of the last valve, between which and the negative grid-bias lead another low-frequency choke is placed.



Details of Cabinet.

No Distortion

This choke takes the place of the usual grid leak. With the latter providing the only leakage path for a charge collecting on the grid to dissipate there is always a small time lag, during which, with a powerful incoming signal, the grid is apt to store up a negative charge, increasing the impedance of the valve and introducing distortion. With the choke leak, however, the resistance to any increasing charge is negligible, and so the charge is dissipated before it has time to build up.

On the other hand, the choke offers a high impedance to alternating currents—such as found in speech and music frequencies.

Tuning Coils

With regard to the tuning system, this consists of three coils, the aerial, secondary and reaction coils, connected in the usual manner. From the H.T. side of the reaction coil to the filament of the detector valve a variable condenser is shunted, and this condenser provides control of reaction, governing the amount of feed-back to the grid of the valve by altering the impedance of the plate circuit.

The three coils are wound on a cylindrical former provided with six sockets, which fit into six plugs arranged on a small ebonite platform. In this manner reception on different wavelength bands is possible by the use of different coil units.

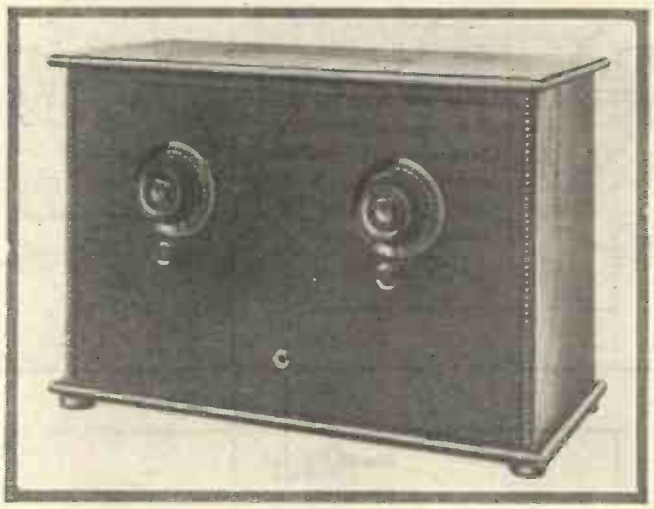
Low Wavelengths

For ordinary broadcast wavelengths between 250 and 600 metres the specification for the coil is as follows:—An ebonite former is required 4¼ in. long having triangular projections running in a direction parallel with the axis. Such a former may be obtained from the British Ebonite Co., and its diameter, measured over diametrically opposing projections, is 2¾ in.

There are six triangular projections equally spaced round the former and between each projection and ¼ in. from the end of the former a hole is drilled large enough to take a 2 B.A. brass nut and bolt, each of which clamps an Eastick "eye adaptor" to the former.

Winding the Aerial Coil

The aerial coil is wound on first beginning at ½ in. away from the end of the former where the eye adaptors are mounted. This coil consists of 10 turns of No. 20-gauge d.c.c. wire wound with the turns close together, and the two ends taken through holes drilled in convenient positions on the former and soldered to two adjacent eye adaptors. Both of these adaptors should be marked in some way which will distinguish them from the other adaptors.



Front View of the Music-lover's Three-valver.

As shown in the accompanying sketches of the coil, these tappings are labelled Nos. 1 and 2 and are connected to the eye adaptors that are also labelled Nos. 1 and 2.

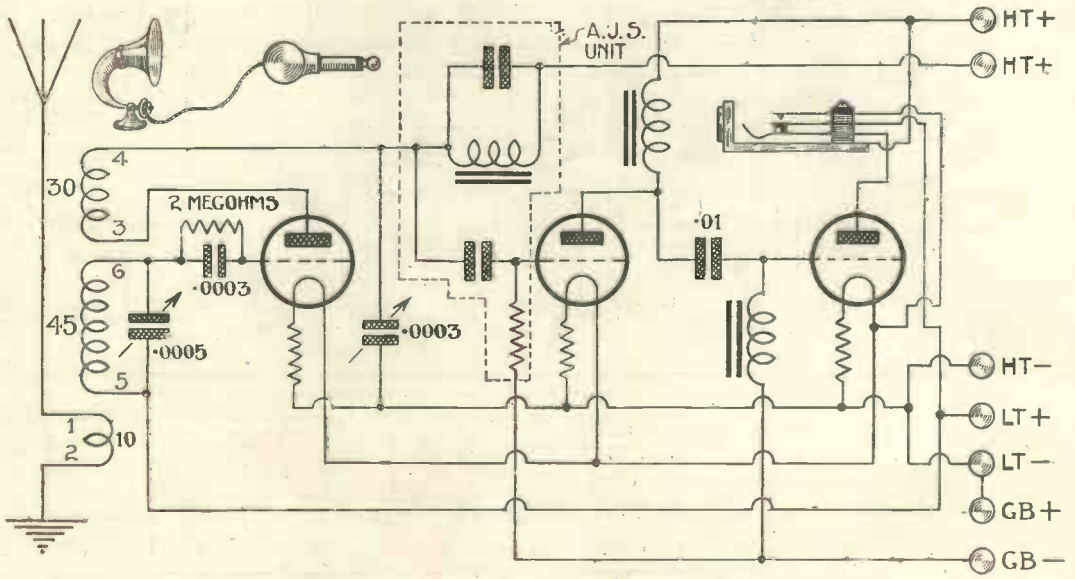
The secondary winding is wound on next, leaving ⅜ in. space between the last turn of the aerial winding and the first turn of the secondary winding. Altogether, 45 turns of No. 28-gauge d.c.c. are required for the secondary, the first and last turns being taken to eye adaptors Nos. 5 and 6, respectively.

Reaction Winding

Leaving another ⅜ in. space, the 30 turns of No. 33 d.c.c. required for the reaction coil are wound on, the first and last turns being connected to eye adaptors Nos. 3 and 4, respectively.

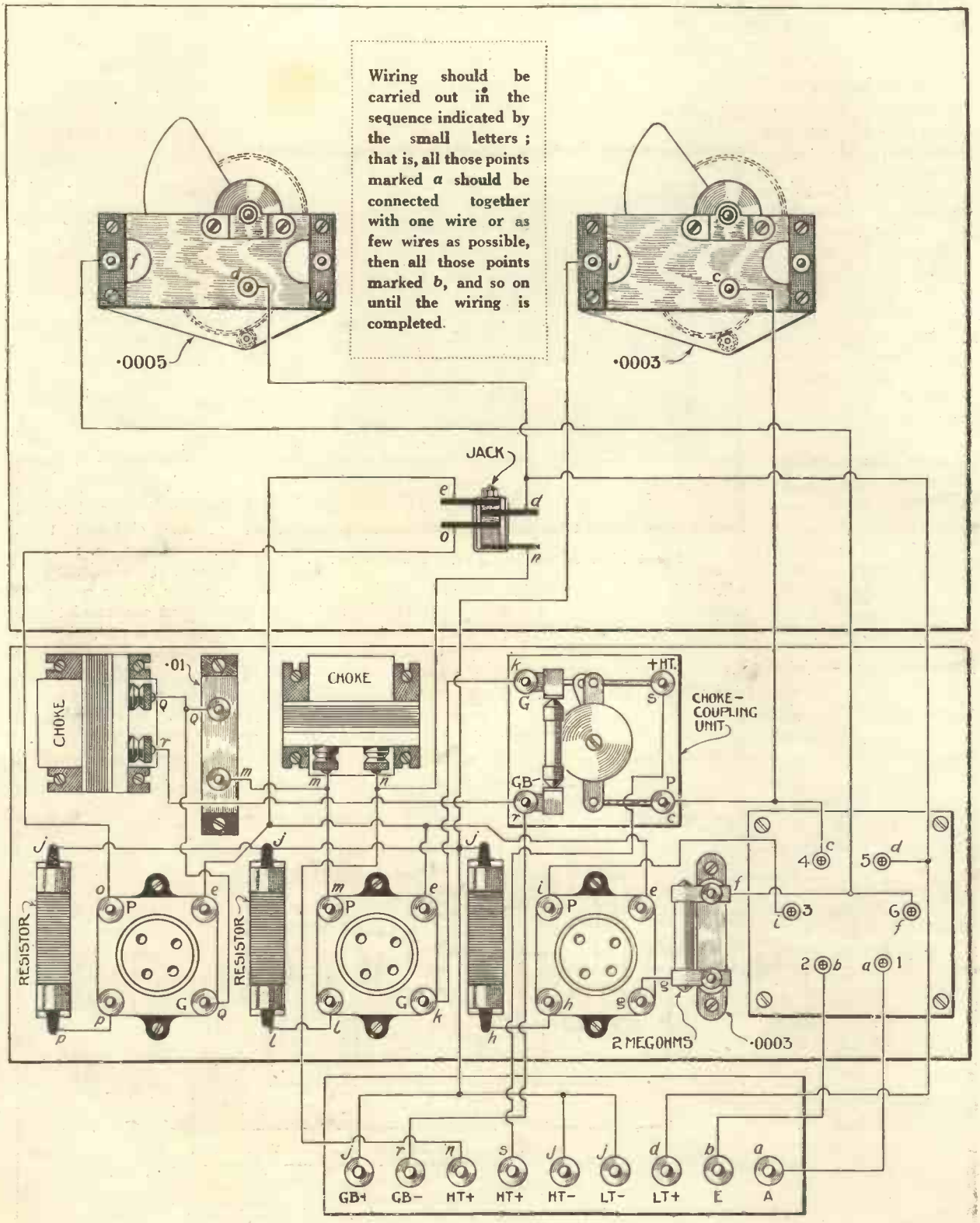
That completes the construction of the ordinary broadcast-wavelength coil unit.

For Daventry, a coil unit consisting of the same former but with a different arrangement of the windings will be required. In this case the separate aerial coil is left out and the secondary, consisting of 160 turns of No. 28-gauge d.c.c. wire is wound on and tapped at the eightieth turn. Eye adaptor No. 1 is connected to this tapping, whilst eye adaptors Nos. 2 and 5 are joined together and connected to the first turn of 160-turn coil, the last turn being connected to eye adaptor No. 6. The reaction coil consists of forty turns of No. 28 d.c.c. wire connected, as before, to eye adaptors Nos. 3 and 4.



Circuit Diagram of the Music-lover's Three-valver.

The Music-lover's Three-valver *(Continued)*



Combined Layout and Wiring Diagram of the Music-lover's Three-valver.

A Special "Wireless Magazine" Design

A mounting base, of course, is necessary, and this is made from a piece of ebonite 3 in. square on which six plugs are mounted in the form of a circle, having the same diameter as the circle formed by the eye adaptors in the coil unit. The plugs are so mounted that the eye adaptors on the coil unit fit easily over the plugs.

Components Required

Other components required for the construction of the set are given in the following list:—

Ebonite panel, 14 in. by 9 in. (Trelleborgs or Clayton, Becol, American Hard Rubber.)

Terminal strip, 7 in. by 2 in. (As above.)

Ebonite coil platform, 3 in. square. (As above.)

Low-loss coil former, 4¼ in. long by 2¾ in. overall diameter. (Becol.)

3 anti-microphonic valve holders, baseboard mounting. (Benjamin or Lotus, Burndept.)

3 fixed filament resistors. (Burne-Jones.)

9 engraved terminals. (Eastick or Belling and Lee.)

.0005-microfarad variable condenser. (J.B. or Dubilier, Ormond, Ediswan, G.E.C., Sterling, R.I.)

.0003-microfarad variable condenser. (J.B. or Dubilier, Ormond, Ediswan, G.E.C., Sterling, R.I.)

L.F. choke-capacity unit, first stage. (A.J.S. or Watmel.)

2 L.F. chokes. (A.J.S.)

6 eye adaptors and plugs. (J Eastick.)

.01-microfarad fixed condenser. (Dubilier-Mansbridge or T.C.C.)

Phone plug and jack to cut off filament supply when plug is withdrawn. (Bowyer-Lowe or Igranic-Pacent.)

.0003-microfarad condenser with grid-leak clips and 2-megohm grid leak. (T.C.C. or Dubilier, Mullard.)

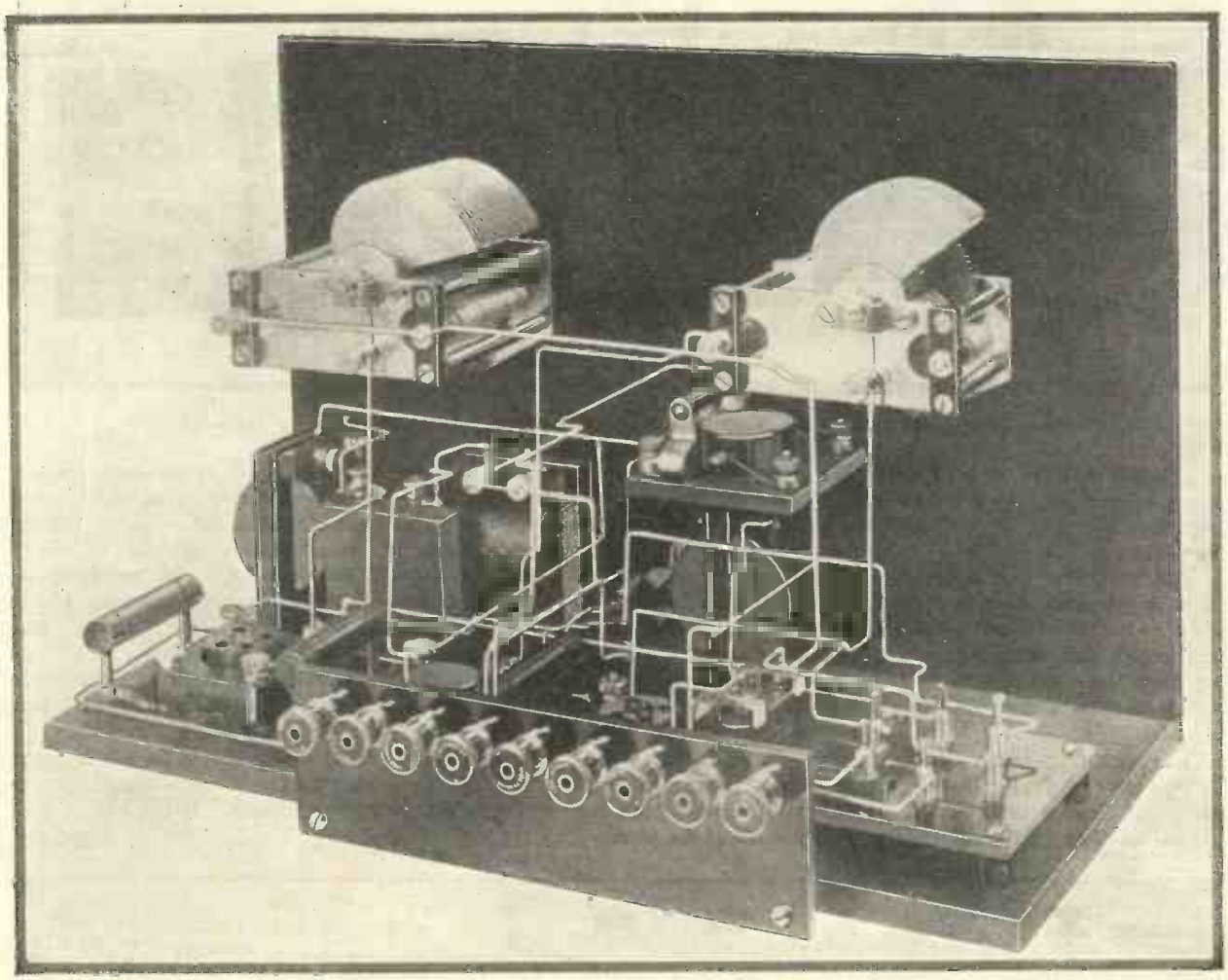
Baseboard, 14 in. by 6 in., and cabinet. (Unica Cabinet Co.)

The panel, which may be obtained cut to size, should be drilled according to the panel-drilling diagram. This shows the positions of the eight holes to be drilled. When this has been accomplished the two variable condensers and the jack are mounted on the panel, the smaller variable condenser being mounted on the left (looking at the front).

Attention should next be turned to the baseboard, which consists of a piece of hard wood such as teak, measuring 14 in. by 6 in. by ⅜ in. On this the remainder of the components are mounted, as shown in the photographs and wiring diagram.

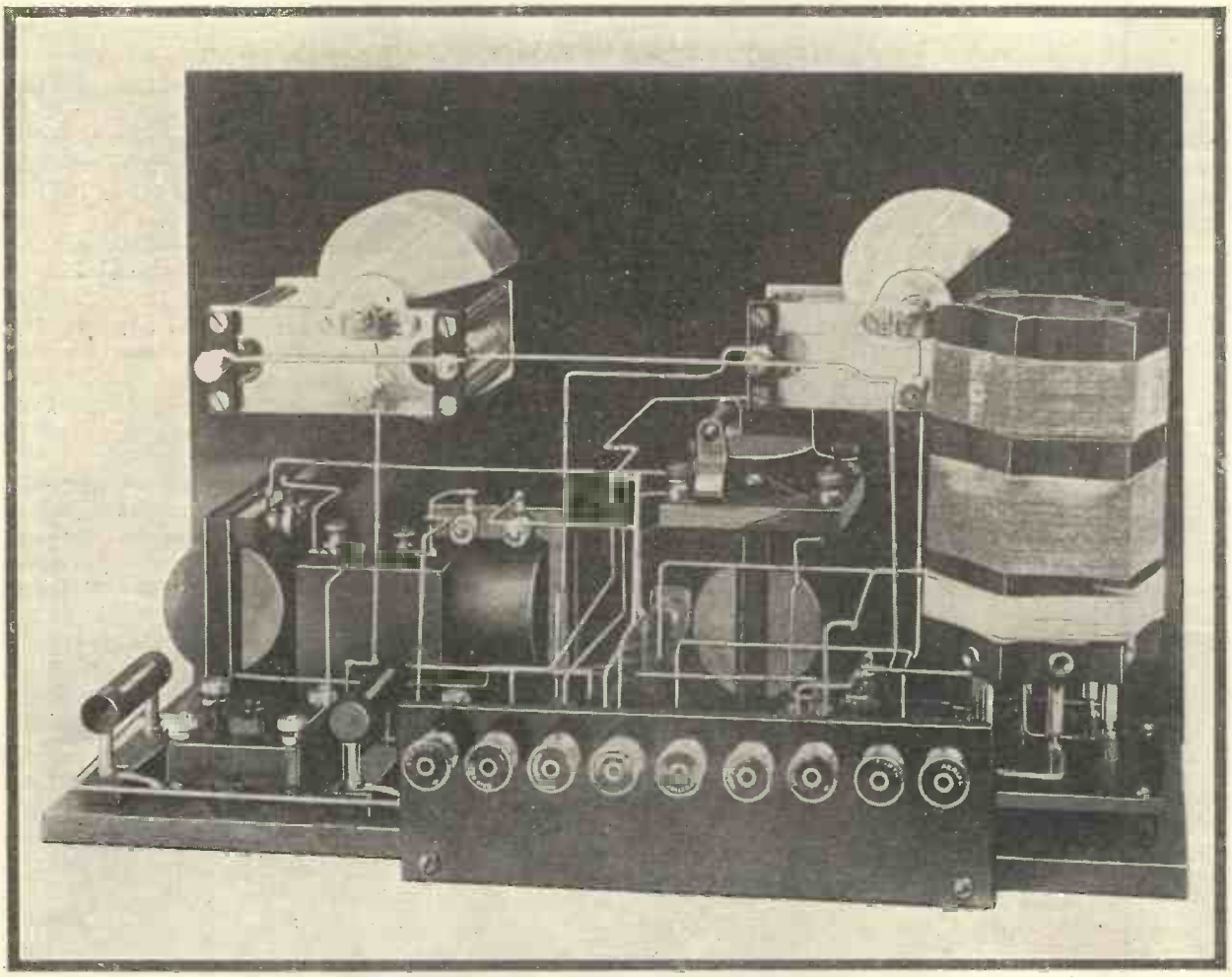
Terminal Strip

The terminal strip, carrying the nine terminals, is mounted on the back edge of the baseboard, in such



Photograph showing the Wiring of the Music-lover's Three-valver.

The Music-lover's Three-valver *(Continued)*



Another photograph showing the Disposition of the Components of the Music-lover's Three-valver.

a position that the ends of the strip are 5 in. and 2 in. from the left- and right-hand corners of the baseboard, respectively.

The mounting panel for the coil unit is mounted at the right-hand corner of the baseboard (looking from the back), the three valve holders, resistors, grid condenser and leak being fixed in a row parallel to the panel.

The mounting panel, by the way, is kept clear of the baseboard by four pieces of ebonite tube, ½ in. long, acting as distance-pieces.

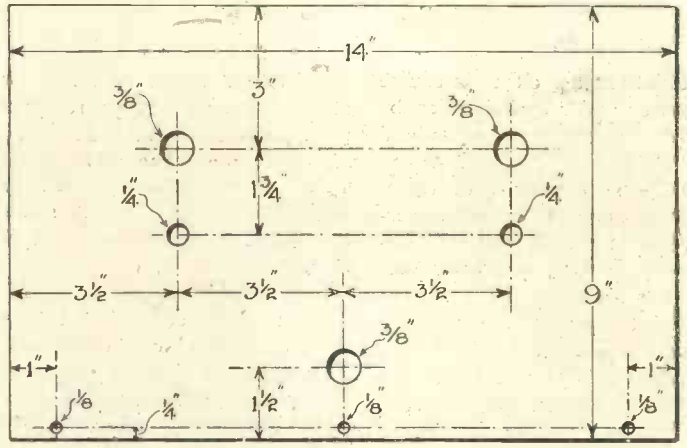
To the right of the jack and underneath the reaction-control condenser, the first choke-capacity coupling unit is mounted on the baseboard, the other two chokes and coupling condensers being mounted underneath the large variable condenser. It may be pointed out here that the secondary of a low-frequency transformer will serve admirably as the grid choke-leak of the last valve.

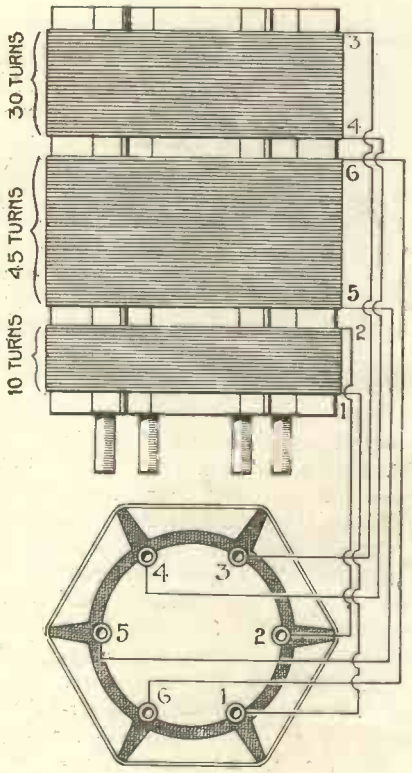
Panel and baseboard may now be screwed together by three 1-in. brass wood screws passing through the bottom of the panel.

Wiring should be carefully carried out in conjunction with the wiring diagram, which indicates, by means of small letters of the alphabet, the sequence in which the components are connected together. Thus, all those terminals marked *a* are connected together *first* with one wire, or as few wires as is convenient. Next all those marked *b* are joined up, and so on.

Special care should be taken when wiring up the plugs mounted on the ebonite platform. If the wiring diagram is carefully followed, especially

A Set That is Simple and Efficient





(*Above*)—Layout of Front Panel.

(*Right*)—Details of Coil Winding.

with regard to the coil connections, no trouble should be experienced.

The wiring completed, the set may be placed in its cabinet and the terminals connected up to aerial, earth and the batteries.

Suitable Valves

Valves recommended are as follows:—For a 6-volt accumulator, use a DE8 H.F. (Osram or Marconi) for the detectors and two DE8 L.F.'s for the L.F. valves. For a 4-volt accumulator, use an Ediswan GP_4 for the detector, followed by two PV_4's or Mullard PM_3 (detector) followed by two PM_4's. Cossor Point-one valves are excellent for use with a 2-volt accumulator.

It is most important that the resistors obtained should suit the valves used.

Operating the Set

To operate the set, plug the low broadcast wavelength coil into the sockets on the ebonite platform, making *absolutely certain* that the number of each eye adaptor corresponds with that of the plug on the platform over which the adaptor fits.

Plug the loud-speaker into the jack on the front of the panel and set the disc of larger variable condenser (on the right) at zero. Slowly turn the dial of smaller variable condenser until the set is just on the point of oscillating.

Keeping the set in this condition, turn the right-hand dial until a station is tuned-in, after which the tappings to the H.T. and grid-bias batteries should be adjusted until the best results are obtained.

By withdrawing the plug from the jack mounted on the front of the panel the filament circuit of the three valves is instantaneously broken and remains so until the plug is inserted into the jack again.

The plug thus constitutes a key by means of which no unauthorised person may tamper with the receiver during the owner's absence.

It is important that the reaction variable condenser should not be too large. It should not exceed .0003 microfarad, otherwise the control of the set will become extremely difficult. The number of turns of the reaction coil should also be kept as low as possible.

All external apparatus, including batteries, aerial and earth and loud-speaker, is connected to terminals at the back of the set leaving the panel front free from untidy connections.

With a good outside aerial and a low-resistance earth, the following stations were tuned-in on the loud-speaker at a distance of 8 miles from 2LO: London, Birmingham, PTT, Daventry, Radio-Paris and Hilversum. The stations PTT and Hilversum were not received at good loud-speaker strength, but were quite audible in a small room.

Using phones a few other stations could be heard, including Bournemouth.

Continental Notes

Some Strays by JAY COOTE

THE Danish Posts and Telegraphs, in conjunction with the Radioraadet, the Copenhagen Broadcasting Company, have now conferred new benefits on ordinary telephone subscribers. As the Sunday sacred services are relayed by landline for all wireless licence holders, these transmissions, in consideration of a very reduced fee, have been made available to all houses in which a telephone instrument is installed.

Sunday Mornings

On Sunday mornings, therefore, at 10 a.m., it is possible to switch in the St. Elias Church, at 11 a.m. the Garrison Church, or, later, Evensong relayed from the Cathedral.

A similar scheme is under consideration for The Hague (Holland), and it may be put into operation simultaneously with the formation of a new State-aided broadcasting company, for which many alternative proposals have already been put forward.

For the present, in the case of Denmark, the subscriber is limited to the telephone reception of religious transmissions.

* * * *

Many listeners will have noticed that the reception of transmissions from Berlin on 1,300 metres is frequently marred by morse interference. For some time I was under the impression that wireless fans in the British Isles alone were worried in this manner, and that the intrusion was of British origin.

I find, however, complaints in this direction are constantly received from German listeners, and from what I have been able to ascertain the interference is caused by the Swinemunde coastal station on 1,100 metres.

Representations have been made to the German authorities by compatriots, and a promise given to them that steps will be taken to alleviate the trouble.

* * * *

The list of European broadcasting stations published in the end pages of the present issue will give you some idea of the development which has taken place in wireless transmission since 1922. But, very many new installations are either in course of erection or under consideration by the numerous European cities and towns.

When the new scheme of wavelengths was adopted by the International Union of European Broadcasters in July last, provision was made in the waveband for a further number of transmitters, for which applications had been received, and by the end of this year it would not surprise me to see another score of them—if not more—take the air.

In France, for instance, if by the time these notes are in print broadcast telephony has come under State control—which I take leave to doubt—work will have been started on new stations at Lille, Strasburg, Angers, Bourges, Rennes, and other minor districts.

Providing funds are available the French Posts and Telegraphs wish to extend their activities to the entire country, and, unless something untoward happens, most of the private installations will be compelled to take a back seat. But in France one never knows.

* * * *

In other European countries, where the State is already interested in the broadcasting service, prognostications are less doubtful. Austria by now will be getting the new Salzburg and Klagenfurt relays into operation, and its neighbour, Czecho-Slovakia, will be planning transmitters at Uzhorod, Bratislava (Pressburg), and increased power for the Brno plant.

Norwegian Relays

Norway is anticipating the demand for small relays in out-of-the-way districts such as Vardo, Tromsoe, Eidsvold, Stavanger, Christiansand, Skien and Drontheim, all to take their programmes from the capital.

And Sweden, where the population is now badly bitten by the radio bug, will shortly install its new high-power station.

Whether Radio Belgique, unsupported as it is by the Belgian Government, will open stations at Liége, Ghent, and Charleroi, is a debatable point. Most of the Belgian radio fans have but the Brussels concerts on which to fall back on such nights as foreign reception is unfavourable; in the ordinary course of events they take their entertainments from Daventry, Hilversum, Radio-Paris, and from some of the German medium-powered transmitters.

Considerable impetus would be given to the broadcasting movement in that country were the Posts and Telegraphs to divert a portion of the income derived from the wireless tax to the Brussels company.

Both Roumania and Greece have a service in contemplation; the two countries already possess numerous enthusiastic clubs, and within a short period Bucharest and Athens calls should be on the ether.

More Stations

By the end of the year there is little doubt that our nightly list of captures will have grown considerably. Providing that the individual stations respect their promises by adhering to their allotted wavelengths, listening again should become a pleasure to all.

* * * *

My reference to Belgium prompts me to add that at the moment I am spending a few days on the coast of Flanders. I decided this year to abstain from taking a wireless receiver with me, and the fact that one of the hotels proudly advertised its possession of a special radio room tempted me.

My first glimpse of the apparatus confirmed the report that Belgium had not kept pace with the general European broadcasting movement.

From the point of view of reception, the hotel itself was fairly favourable, but during a greater portion of the day listening on the lower portion of the broadcasting waveband was completely marred by morse signals. Steamers from Hamburg, Amsterdam, Rotterdam, and Antwerp, on their way to London and Southern ports, kept up a continuous conversation with each other, and of the British programmes, the only one satisfactorily "capturable" was Daventry.

Isaac Hobbs hated music.

The Second Performance

A Wireless Story by E. BLAKE

Illustrated by CHARLES CROMBIE

ISAAC HOBBS hated music. Street musicians were driven from his door with curses; Salvation Army bands, Christmas waits and carol singers sought his bounty in vain. Once, when a representative of a gramophone company called on him, he was as near homicide as could be—short of the act itself.

He lived in as profound a prosy silence as his hatred could compass. He shot the birds and poisoned the love-lorn cats that tried to use his garden as a platform on which to demonstrate their talent. He scared the whistle from the lips of innocent milk-boys and threw lumps of coal at the manipulators of barrel-organs.

He hated music, and that hate, long rooted in his soul, had branched into many other little sins which were choking all the little loves a man cherishes. Once he had had a strong sense of humour and tiny wrinkles played about the corners of his eyes. And once he had thought life not so bad, taking it all round; he took tobacco and a little wine, enjoying them thankfully. But that was in the time of his dead young manhood, his work-time and his love-time.

Once he had loved the crowd, the good-natured jostling of the kindly, common men and women who are the main stream of life. He had loved a dog and even missed the old tortoise, Merlin, when it disappeared from his father's garden after an occupation of thirty years. Once he could potter in a garden, wondering why the smell of wet earth, rotting leaves and wood-smoke stirred something primitive within him.

And once—Lord God, Who mingles the sweet cup of life with gall!—there was a woman who filled his days with contentment and his house with feminine trifles at which he openly jeered but loved in secret.

For ten years he knew happiness such as comes only to married lovers. Florence, his wife, grew round him as clematis blesses a cottage, and made him beautiful. He smiled on her and the world, but in those secret and terrible moments when he shook himself free from the dream he knew that an end must come. Life was full of trouble and sorrow. Death swept away human beings as straws in a wind, and not even love could save them.

Florence played the violin well and they gave and attended the "musical evenings" of the nineties with assiduity, Florence as the willing performer and Isaac the proud husband who was not "musical" but carved a fowl with an easy, flowing stroke which was the envy of most of their hosts.

When Florence met William Aldine, the concert-promoter, Isaac felt a new sensation, not jealousy or ambition, but fear. The volcano was waking up and those who lived on its pleasant slopes must one day be destroyed. It was a premonition, and he hugged it like a man with a hidden sore.

Aldine got Florence a modest en-

The Second Performance *(Continued)*

Isaac stood rigidly, as one pierced suddenly to the heart.

gagement to play in the Corn Exchange. The small fee was more to her than many rubies, though Isaac had an income of fifteen hundred a year and spent most of it on her, her garden and her house. Her performance caught the ear of a man greater than Aldine and Florence was offered a concert at the county town.

Newspaper clippings and correspondence with agencies began to interfere with the ten-year-old peace of Isaac. Unexpected and undesired visitors robbed him of many golden hours when he and Florence might have been sitting together — and living.

Florence began to show signs of a "temperament"; she fussed about her hands, practised the violin five hours a day and draped the sofa, a pale Victorian female with a headache, for the remainder of the day, while Isaac lurked in bathrooms, potting-sheds and suchlike retreats, cursing faintly but with conviction. He did not believe in keeping women down, he told himself. Besides, there was always that volcano.

In the spring of 1900 Florence announced that the inevitable but long overdue event might be confidently expected, and Aldine announced an engagement to play before Royalty. There was plenty of time, said Florence, and it was her Great Chance. Isaac calculated, made prudent allowances, privily consulted the family doctor, and decided to let things go their own way. Perhaps this would be the end of the phase and life might be resumed thereafter, sweeter than ever, in spite of bad nights.

It was the end of the phase. Florence played before Royalty and died in the wings of heart failure before Isaac knew that the volcano had blotted him out. She left him without a farewell word or a smile, without once more calling him "Grumps," that dear, absurd word of their intimacy.

As he looked at her long white fingers for the last time he began to hate music, one of the fairest gems which stud the garments of God. But for those accursed concerts. . .

II.

The earth and Isaac Hobbs were twenty-five years older and music bulked larger than ever in the life of the people when Isaac's brother George died and left a motherless son in his care. The presence of young George did not appear likely to interfere with Isaac's stern asceticism, or to introduce any musical distractions in the house which once was noisy with Florence's fiddle. Boys who whistled could be sent to bed. A boy was not likely to beg for music lessons. Besides, Florence's fiddle was safely locked in a trunk, along with her photographs, letters—and one and a half knitted socks, baby size.

So Young George came, looked around him for six months and decided that it was a dull show and Uncle Isaac a hard old nut. But he managed to get a good deal of fun up in the attic, which was full of junk, mostly feminine.

This wireless was a great lark. There you could sit on an old locked trunk and listen to the most frightfully interesting things—explorers, soldiers, aviators, all yarning like one o'clock, and military bands and tattoos, plays and ghost stories. A guinea crystal set and a wire which Uncle George never even noticed transformed the attic into a boy's paradise.

Young George hated "love and all that kind of rot." He drummed his heels on the trunk in which Florence had once packed her wedding clothes, and hummed "Tea for Two" while

A Wireless Story by E. Blake

he waited for Major Bangs to talk about "Cannibals I have known."

One wet Sunday evening after Young George had gone to bed, lonely old Isaac plodded up into the attic. An unusual restlessness had invaded him during the day. Somehow Florence seemed nearer and the pain at his heart—it had come to him that evening in 1900 when he had been hastily summoned to the wings of the Loyalty theatre, but had gradually died away—was gnawing again.

He had not visited the attic for many years, and as he climbed heavily up the creaky stairs his pulse thudded. He peered about, barked his shins on the old locked trunk and lighted his candle.

The sight of the trunk affected him much more than its sharp impact on bony leg. He remembered how he had helped her to unpack it—that night; what lacy, delicious mysteries she had lifted from it, blushing the while. The pain increased. What had not that accursed music stolen from him?

Ha! What was this? A bit of a box with knobs! Not his! That boy! So he had been up here, then. He drew closer to the strange object. Ah! of course, he had seen pictures of these wretched wireless sets. Telephones and all manner of silly modern nonsense. That was the limit. Pack the youngster off to some sensible school! Here! On—that—trunk!

He took up the telephones with a contemptuous flirt of his hand. How did the thing work? If a mere boy like George could— He placed them awkwardly on his head.

No! Not that! But yes! A fiddle *—a blasted fiddle—in his house—playing!*

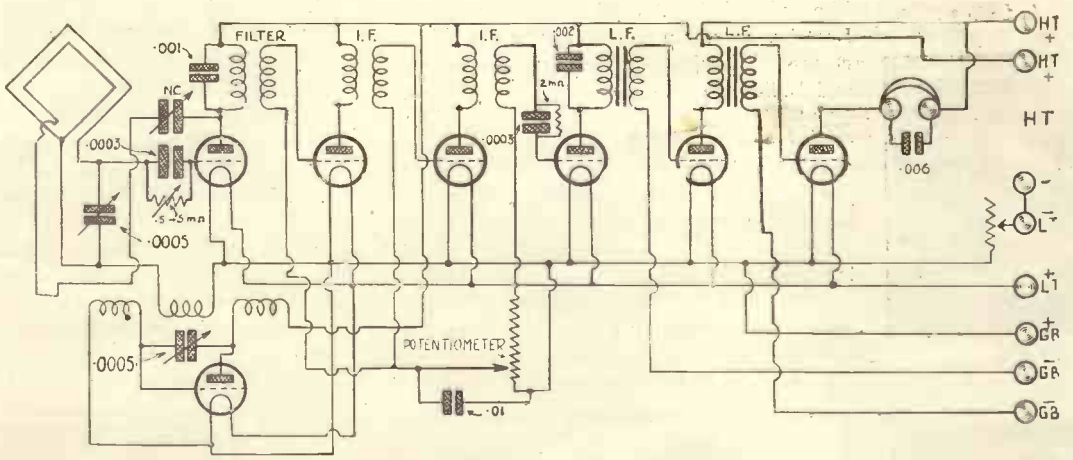
Curiosity is not the least of human passions. Broadly speaking, one might say that it has accounted for the human race, civilisation—progress. Curiosity kept the telephones on Isaac's head and saved his soul alive. For as he listened there, with the guttering candle making the shadows wave over the dead years as represented by the trunk, the two obsolete bicycles, the mouldy tennis racquets and Florence's sewing-machine, some distant violinist began to play Gounod's lovely *Ave Maria*. Florence had played that—before Royalty—and died quicker than the applause.

For a moment or two Isaac stood rigidly, as one pierced suddenly to the heart. Twenty-five years dropped from his shoulders and he was once more in the theatre box gazing at a white-clad woman who played—not to Royalty, but for her husband.

Ah! the blessed relief of tears! He sank to his knees and bowed his head in the dust on the old trunk while Florence played to him as she used long ago. How long ago!

A SPECIAL SEVEN-VALVE SUPER-HET CIRCUIT

for the Experimenter



For those who desire to experiment with super-het receivers, the above circuit will be found ideal. It is a perfectly straightforward circuit with the addition of neutralised control for reaction. A split frame aerial of sixteen turns tapped at the centre will be found to be suitable for ordinary broadcast reception. It may be found advantageous to connect the frame-tuning condenser across the outer terminals of the frame winding instead of across one half of the winding as shown.

Broadcast Music

Mr. Jack Smith, the Whispering Baritone.

IT may be said that the musical programmes of the month have been framed for the few rather than the many. That there is always an audience for classical music has been proved by the success of the great symphony and Queen's Hall Promenade concerts, but that does not mean that the works produced thereat are to the taste of the great masses of the public—for which broadcast programmes should be primarily made.

Heavy classical music and Elizabethan songs to the verge of monotony, alternating with very poor jazz instrumentation, have undoubtedly been the keynote of the month's programmes.

The instrumentalists undoubtedly have included the foremost players of the day, and one recalls such names as Daisy Kennedy (the violinist), Arnold Trowell ('cellist), Beatrice Harrison ('cellist), and the pianists Benno Schonberger, Wassili Sapellnikoff and Lafitte.

Miss Jo Lamb.

Mr. Julian Rosetti.

Big Reputations

The last has a very big reputation all over the Continent for his playing, and on the London classical concert platforms. Over the ether Lafitte's name stands for all that is artistic in pianoforte playing; delicacy coupled with intense power and vitality are the outstanding features of his renderings, and although it would be hard to find greater contrasts than Brahms and Cesar Franck, Lafitte makes triumphant interpretations of both equally well.

Amongst the provincial pianists may be mentioned also Claudia Lloyd. She is best known, of course, in her own Principality. Born at Swansea, the daughter of David Lloyd, J.P., she won the chief prize at the Royal National Eisteddfod of Wales, proceeding later to the Royal Academy, where she is now a sub-professor. She has also written much instrumental and chamber music, and was solo pianist at the Welsh National Festival this year.

Violinists

The violinists have included William Primrose, now of the Modern Trio, Arthur Caterall, Issy Schlaen, and the Manchester player, Miss Jo Lamb, who has been playing the violin since the age of five.

A special pupil of Dr. Adolph Brodsky at the Royal Manchester College, she won the John Webster Exhibition and later toured all over England. She may be considered one of the pioneers of broadcasting, for she played first from the Metropolitan-Vickers Studio in Manchester prior to its being taken over by the B.B.C.

Member of Artistic Family

Miss Lamb is a member of an artistic family, her grandfather being the late Thomas Heatherley, founder of the famous art school in London, whose portrait by Samuel Butler, "Mr. Heatherley's Holiday," hangs in the Tate Gallery.

Her brother is Clifford Heatherley, who acted recently in *The Sea Urchin* and *In the Next Room,* as well as the just-completed Gaumont film, *Mademoiselle from Armentieres.* Miss Lamb has broadcast frequently from London

Miss Claudia Lloyd.

Stainless Stephen.

Mr. Seth Lancaster.

Miss Elsie Taylor.

of the Month :: REVIEWED by :: STUDIUS

and also Glasgow, Nottingham, and Manchester.

Other instrumentalists of the month include Seth Lancaster (a well-known 'cellist), Una Truman (the pianist), Maud Folland, and Julian Rosetti, who has had one of the most romantic careers.

Born in Poland, he studied in Warsaw with Paderewski, who was then teaching in his own country prior to becoming world famous. Mr. Rosetti then accompanied his brother to France, giving concerts in all the large cities on the Continent. During his French stay Mr. Rosetti seized the opportunity to study with Georges Mathias, one of the few surviving pupils of Chopin.

The Allen Sisters.

Later he came to England, playing at London, Manchester and Edinburgh. He played with the great Scottish Orchestra. His recitals and chamber-music concerts are widely attended, and recently he has established a special school of music at Aberdeen.

Many well-known musicians find themselves in the conductor's chair. This month has seen the succession of John Ansell to Mr. Dan Godfrey at 2LO.

A Provincial Conductor

One of the best-known conductors in the provinces is Lionel Falkman, whose orchestra at the Capitol, Cardiff, is so frequently broadcast. Mr. Falkman himself, besides being a conductor, is a noted violinist, pupil of Kalman Ronay and Leopold Auer.

After winning first prize in a competition at the Welsh Eisteddfod at fifteen years of age, he came later to London, becoming first violin in the New Symphony Orchestra under Sir Landon Ronald, in the Royal Opera, Covent Garden, under Richter, and other great conductors.

In addition to founding the Newport College of Music, Mr. Falkman was an original member of the Philharmonic String Quartet, and is late principal violin of the Welsh National Orchestra.

Amongst his many noteworthy performances may be mentioned his playing of the Bleyle Violin Concerto, which he introduced to England and performed with Sir Dan Godfrey at the Winter Gardens, Bournemouth, and later with the Queen's Hall Orchestra at the Welsh Festival. He has made the Capitol one of the musical centres of Cardiff.

Another familiar figure in London and the Northern cities is Albert Lemaire with his famous Cleveland (Ohio) Orchestra. After a successful season at the Piccadilly Hotel he came to the Embassy Club, Edinburgh.

A prize-winner at the age of eleven at

Mr. Watcyn Watcyns.

Mr. Parry Jones.

Mr. Frank Lafitte.

Miss Dolly Elsworthy.

Mr. R. N. May.

Miss Maud Folland

Miss Gwen Powell.

Mr. Albert Lemaire.

Broadcast Music of the Month *(Continued)*

Antwerp, at seventeen he was appointed conductor of the Palais d'Ete of that city. He has other British bands on the Continent, and broadcasts from the Edinburgh station special recitals of symphonised rhythmic dance music.

Fine Vocalists

Some of the finest vocafists of the country have been heard, including the various members of the British National Opera Company, and with them Parry Jones, one of the finest singers on the operatic and concert platforms.

A student of the Royal College, Mr. Jones studied under Visetti and Signor Colli in Milan. His operatic experience includes a long engagement of nearly two years at the Metropolitan Opera House, New York, and it was returning from that on the *Lusitania* that nearly cost Mr. Jones his voice, for he was six hours in the water.

After a very natural breakdown, Mr. Jones resumed his career, joining the D'Oyly Carte Company, then the Carl Rosa, at Covent Garden, and finally the B.N.O.C. Mr. Jones also sang at the two international seasons at Covent Garden, this and last year. Possibly it is this wide range of work that makes his broadcast songs so perfect for diction, tone and expression.

Walter Glynne is another fine singer and operatic star, who has come to the B.B.C. concerts from the Royal Choral Society, Royal Albert Hall, Enoch, Chappell Ballad and Promenade Concerts. Mr. Glynne, in addition to his musical scores, is an old Rugby footballer, and admits to umpteen trophies at golf.

Familiar Names

Most of the familiar names have figured in the programmes—such as Kate Winter, Mary Foster, and Carmen Hill. In the west of England has been heard a brilliant soprano in Elsie Taylor. She possesses a faultless technique and a rare power to broadcast sympathetically.

Two of the best-known artists, Ernest Butcher and Watcyn Watcyns, have been heard during the month. Both of these have made a special cult of English songs, which have been recorded so as to form additions to the home music library.

On the lighter side we have certainly had some very good exponents of the art of entertaining. At 2LO has broadcast Jack Smith, the whispering baritone, lately appearing also at the London Coliseum. He admits that he has made a special cult of broadcasting so as to "carry over" his own particular trick of singing.

THE WALSH BROTHERS

I think we have all chortled over the items of the clever actor who hides his light under the modest title of Stainless Stephen, and his playlets, *Oscillating Oscar* and *One-punch Licorice*. Mr. Arthur Clifford (if I can be forgiven for revealing his identity) is, like John Henry, a Yorkshireman and hails from Sheffield.

He, too, showed his mettle in entertaining his comrades on the Western Front, afterwards proceeding to tour in vaudeville; since the war he has specialised in Protean acts, doing twenty-five consecutive weeks with one act alone. His first broadcast was made from the Sheffield station, though he has since made several tours and included 2LO.

The Walsh Brothers

The Walsh Brothers are clever instrumentalists with saxophone and banjo duets. Clever duettists, too, are the Sisters Allen. They come to us from America, but incidentally are the great-granddaughters of the late Henry Russell, the popular singer and composer of "Cheer, Boys, Cheer," and "Life on the Ocean Wave." They are vocalists and instrumentalists as well.

Dick Henderson is another Yorkshire comedian, who will be remembered for his command performance, as well as for his first broadcast recently at 2LO.

Dramatic Element

The dramatic element has been worthily upheld by the readings given by well-known actors, such as Allan Aynesworth, Basil Gill, and Gwen Ffrangçon Davies. At Cardiff is often heard Miss Gwen Powell, who is known for her clever sketches and character parts.

Drama is evidently to be an important factor in future broadcast programmes, for the B.B.C. announce that they have organised special courses of training at the Royal Academy of Art, with the object of fostering talent that can be used for broadcasting. Microphones will be installed and prizes offered. On the Committee are Kenneth Barnes, Director of Studies at the R.A., and Mr. R. E. Jeffrey, the Productions Director of the British Broadcasting Company.

Possibly in the future we shall have more entertainment and less of the monotonous talks, which are still being unduly prolonged.

The COSMOPOLITAN NINE

A THREE-UNIT SUPER-HET

2—The Intermediate-frequency Amplifying Unit.

IN the last issue of the WIRELESS MAGAZINE we described the first unit of the Cosmopolitan Nine, a super-het. built in three units. This month we are describing the intermediate-frequency amplifier and second detector unit, a most important portion of the receiver and one that needs careful design.

No Tuning Controls

Besides the filament rheostats and the potentiometer to check any tendency for the amplifier to oscillate, there are no tuning controls, the wavelength of the intervalve coupling units being fixed at a definite value.

The wavelength of these coupling units is a very important factor. It is quite possible, for instance, for a sensitive set, such as this, to pick up some long-wave station in the intermediate-frequency amplifier, and as the wavelength of the latter is fixed it would be impossible to tune the station out.

The wavelength of the amplifier, therefore, should have some value other than that of any of the high-power, long-wave transmitting stations.

Moreover, the selectivity of the amplifier must not be too great, nor must the amplification be too low, as both these qualifications are in a sense contradictory. A happy medium must be found.

To obtain the greatest amplification, the valve must work on the portion of the characteristic curve to the left of the zero grid volts line—that is to say, the grid of each valve must have a negative potential.

Valve Stability

This can only occur if the valve is stable and will not break into oscillation, in which case some form of damping device will be required.

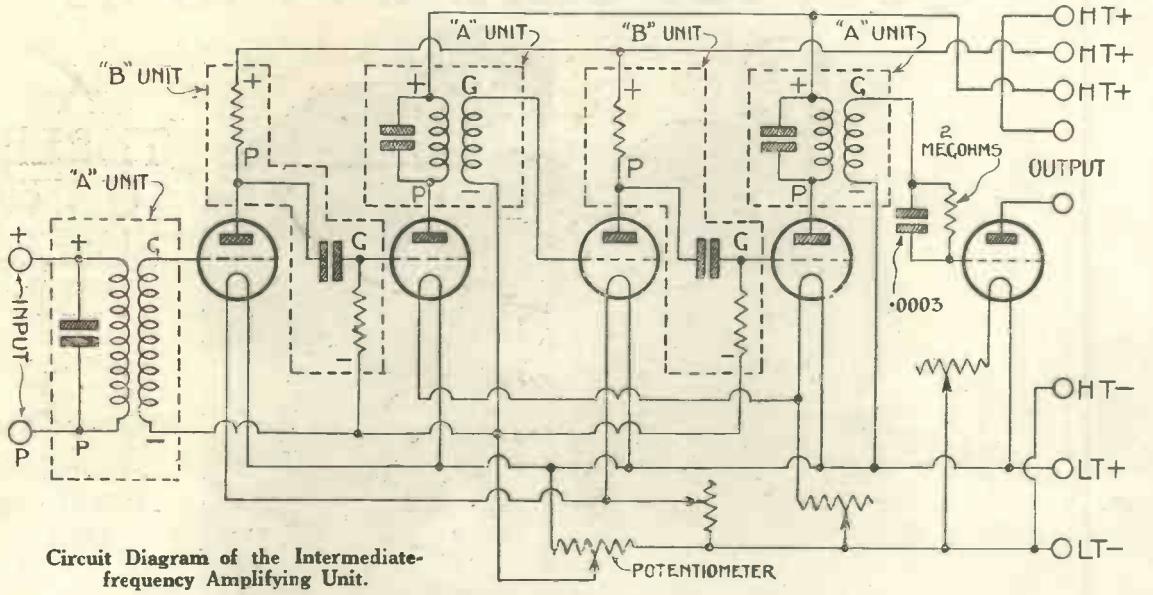
It is always safer, of course, to fit a damping potentiometer, but the

WHAT HAS BEEN DONE WITH THE COSMOPOLITAN NINE.

All the stations mentioned in the following list were received on a frame aerial within a mile of 2LO, at comfortable loud-speaker strength. No station that is logged below was received for less than 10 minutes and in each case the programmes have been independently confirmed. These stations were all received during two evenings in July; many other stations were heard, but as reception was marred by atmospherics and static they were not logged. Only those stations have been logged that were received comfortably.

Station.	Wave-length.	Aerial Cond.	Oscillator Cond.	Station.	Wave-length.	Aerial Cond.	Oscillator Cond.	Station.	Wave-length.	Aerial Cond.	Oscillator Cond.
Milan	320	27	37	Glasgow 5SC	422	42.8	55.5	Birmingham 5IT	479	57	69
San Sebastian EAJ8	346	31	41	Rome 1RO	425	43	56	Lyons PTT	480	58	70
London 2LO	365	35	45	Toulouse	433	45	58	Munich	484	62	73
Madrid EAJ7	373	37	47.5	Berne	435	48	60	Brussels	487	63	73.5
Bournemouth 6BM	386	39	50	Stuttgart	446	49	61	Aberdeen	495	66	78
Hamburg	392	40	51	Leipzig	452	54	64	Berlin	504	65	75
Dublin 2RN	397	41	52	Paris PTT	468	55	66	Zurich	513	68	78
Munster	410	42	53	Frankfort	470	56	68	Vienna	531	70	81
Breslau	418	42.2	55								

The Cosmopolitan Nine *(Continued)*



Circuit Diagram of the Intermediate-frequency Amplifying Unit.

amplifier should be so constructed that the slider of the potentiometer is always at the negative end of the resistance winding.

In the amplifier unit we are describing there are five valve-coupling units, three of which consist of long-wave H.F. transformers and the remaining two of resistance-capacity units.

Alternate Units

They are so arranged that the first stage of I.F. amplification contains a transformer, the second stage a resistance-capacity unit, the third stage a transformer, the fourth stage a resistance-capacity unit, and the last stage a transformer. The transformer units are thus separated by a resistance-capacity unit.

Each transformer possesses a fixed condenser across the primary winding, and all are wound to the same wavelength. The resistance-capacity units are more or less aperiodic in their response to H.F. oscillations, and they will, therefore, amplify the frequency passed on by the transformers, and will add just sufficient stability to the whole amplifier to allow the valves to give their maximum amplification.

This unit also contains the detector valve, which follows the last stage of intermediate-frequency amplification. The connections of the detector valve are normal, and do not require any explanation.

A full list of the components required for the construction of the second unit follows here:—

Ebonite panel, 18 in. by 7 in. (Trelleborgs or Becol, American Hard Rubber.)

Terminal strips, 9 in. by 1¾ in. and 1½ in. by 1¾ in. (as above).

3 magnaformers, type A, and 2 magnaformers, type B. (Burne-Jones.)

5 anti-microphonic valve holders. (Benjamin or Lotus, Burndept, Nil-phonic.)

10 engraved terminals. (Belling and Lee.)

3 filament rheostats. (Lissen or G.E.C., Ormond, Ediswan, Wates, Penton, Precision.)

Potentiometer. (Lissen or G.E.C., Ormond, Ediswan.)

3-megohm grid leak and .0002-microfarad condenser. (T.C.C. or Dubilier, Mullard.)

Baseboard, 18 in. by 6 in. by ⅜ in. thick.

Cabinet. (Unica Cabinet Co.)

NOTE.—The particular components shown in the photographs and allowed for in the dimensioned layout are in each case mentioned first.

One-hole Fixing

All the components mounted on the panel, including three filament rheostats and one potentiometer, are of the one-hole fixing type, thus rendering the drilling of the panel a very simple matter.

The potentiometer is mounted centrally at the top of the panel and directly below it one of the filament rheostats is fixed. On each side of the panel one of the remaining two rheostats is mounted, so that the whole presents a symmetrical appearance.

Positions of Holes

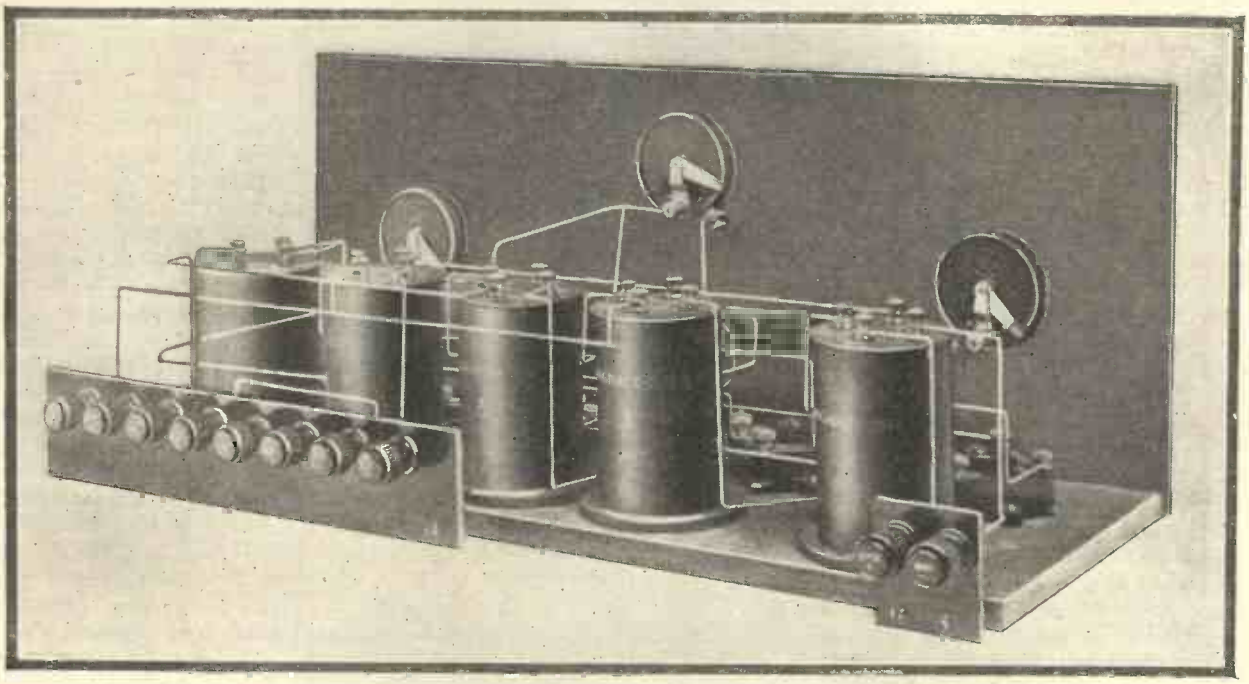
The positions of all the holes to be drilled and their sizes are shown in the panel-drilling diagram. It will be noted that 3 holes, drilled along the bottom of the panel, are required for screwing the panel to the baseboard. The other larger holes are for the rheostats and potentiometer.

After mounting these components the panel is left aside, and attention turned to the baseboard, which consists of a piece of hard wood measuring 18in. by 6in. by ⅜in. thick.

On the baseboard the valve-coupling units, valve holders, grid condenser, and leak are mounted in the positions shown in the wiring diagram.

The large ebonite terminal strip carrying the terminals is screwed to the left-hand corner of the back edge of the baseboard by means of two 1in. brass wood screws, whilst the smaller strip, on which the two input terminals are mounted, is screwed to the right-hand corner.

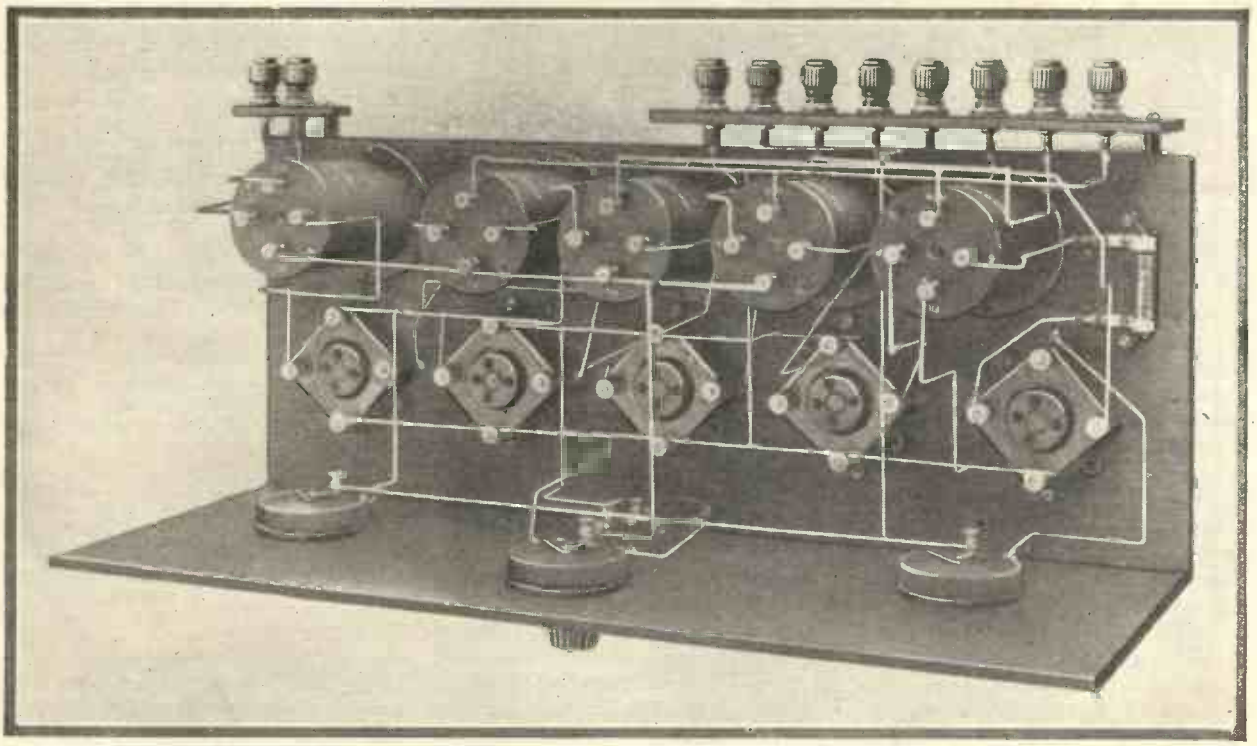
A Three-unit Super-het



Photograph showing Disposition of Components of Intermediate-frequency Amplifying Unit.

Full details of the sizes of the terminal strips and the positions and dimensions of the holes to be drilled to take the terminals and for attaching the strips to the baseboard are shown in the drilling diagrams of the terminal strips.

The valve-coupling units are fixed to the baseboard in a row parallel to the panel and close to the back edge of the baseboard, exactly as shown. Note that the A and B types are mounted alternately, one of the A types being mounted on the right-hand side of the baseboard, look-



Another Photograph showing the Positions of the Components on the Baseboard.

The Cosmopolitan Nine *(Continued)*

ing from the back, and next to it the B type is mounted, then the A type again, and so on, ending with another of the B type on the left-hand side of the baseboard.

Between the coupling units and the panel the valve holders are mounted, also in a row. The disposition of these components will be clearly seen from the photographs and wiring diagram.

After the components have been fixed in their correct positions, the panel and baseboard should be fixed together by means of 1in. brass wood screws passing through the holes drilled along the bottom edge of the panel and screwed into the front edge of the baseboard.

Wiring may now be started, and for this to be accomplished quickly and easily, good use should be made of the wiring diagram, which not only shows the way in which each component is connected up, but also affords an indication of the order in which the wiring should be carried out.

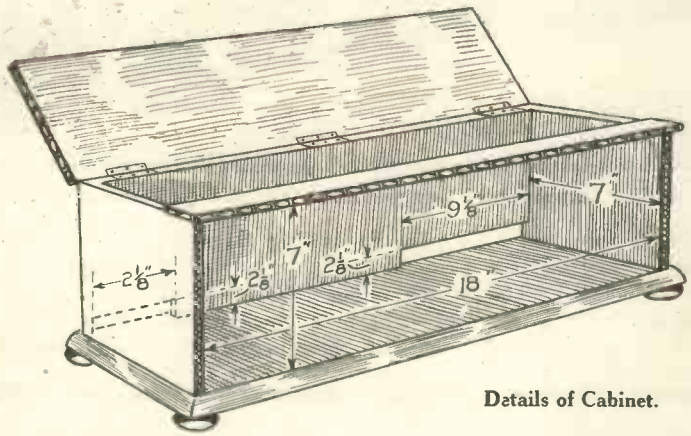
The terminals of every component are marked with a small letter of the alphabet, and the wiring should be carried out in the order of the letters. All those terminals marked *a*, for instance, should be wired up first with one wire or as few wires as possible. Then all those marked *b* are connected up next in a similar fashion, after which those marked *c*, and so on, until wiring is completed.

Final Check

After a final check of the wiring the amplifier may be placed in its cabinet. With the exception of the dimensions, the general design of the cabinet should be on similar lines to that housing the first unit.

This, of course, is not essential to the efficiency of the receiver, but the appearance of the complete set is greatly enhanced by the use of cabinets having a similar appearance.

Photograph of the Complete I.F. Amplifying Unit.



Details of Cabinet.

A dimensioned sketch of the cabinet is given for the benefit of amateur cabinet-makers, but to those who are not gifted in this direction we recommend the makers indicated in the list of components.

Slots are cut in the back of the cabinet to allow the terminal strips to project through the back of the cabinet.

Now we come to the question of valves, a very important factor in the efficient working of an intermediate-frequency amplifier. The filament voltage of the valves must be identical to that of the valves used in the first unit.

If six-volt valves are used in the first unit, then six-volt valves must be used in the second unit, and we recommend the Osram or Marconi DE8 H.F. type both for the I.F. stages and for the detector—that is, five DE8 H.F. valves. Other good valves that we can recommend are the Burndept H512 type.

For a 4-volt accumulator we suggest the Mullard D H.F. for the I.F. stages and a D.06 for the detector. The Ediswan valves type AR H.F. for the I.F. stages and a GP_4 for the detector make an excellent combination.

For a 2-volt accumulator good results can be obtained from the Cossor point-one red top for the I.F. stages and a plain top for the detector. The Osram DE2 H.F. are also excellent valves.

Now we come to the operation of the first and second units. The two output terminals of the first unit are connected up to the two input terminals of the second unit. These connections must not be made haphazardly but in the correct manner, as shown in the circuit diagram.

A pair of phones is connected to the output terminals of the second unit, and the H.T. and L.T. terminals of both units are joined up to the same H.T. and L.T. batteries. Two distinct sets of H.T. and L.T. batteries are *not* required.

Suggested Voltage

For a trial apply the following H.T. values to the plates of the respective valves :—

First Unit.

Receiving valve—plate voltage, 40.
Oscillator valve—plate voltage, 80.

Second Unit.

Valves with I.F. transformer in plate circuit—plate voltage, 100.
Valves with resistance in plate circuit—plate voltage, 120.
Detector valve—plate voltage, 40.

The above figures were obtained from the original set using Osram DE8 H.F. and DE8 L.F. valves.

A Special "Wireless Magazine" Design

Other types of valves will probably require different voltages.

Turn on all the filament rheostats until the filaments of the valves reach a suitable temperature, and turn the slide of the potentiometer until it is right up to the negative end of the resistance winding.

Reaction Condenser

Place the reaction condenser on the first unit at zero and slowly turn the two large condenser dials on the first unit until signals are heard. The first station to be tuned in will probably be the local one.

If the I.F. amplifier is oscillating this may be checked by adjusting the potentiometer. If the latter needs to be turned a considerable amount, thereby introducing a damping effect, try reducing the H.T. voltage applied to the plates of the I.F. valves.

Every station should be received on two settings of the oscillator dial of the first unit. Incidentally, this is an indication that the oscillator is functioning properly.

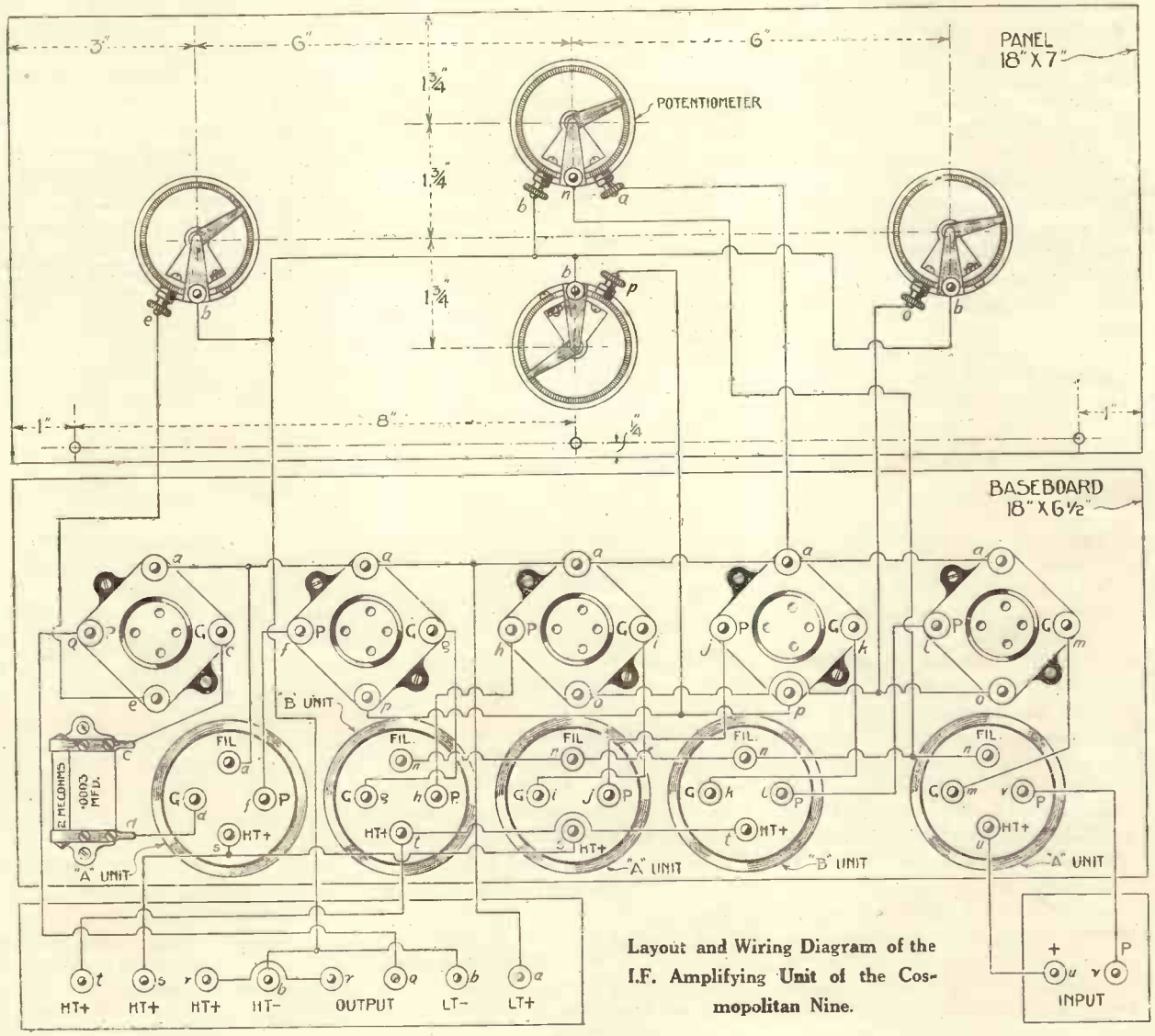
By adjusting the reaction condenser the signal strength may be greatly increased, but care should be taken that the number of reaction turns in the frame aerial is not so great that the receiving valve refuses to stop oscillating no matter how the reaction condenser is adjusted.

The very minimum number of reaction turns should be used to give a smooth control by means of the condenser.

Constructors should concentrate on obtaining the maximum efficiency of the two units. If dissatisfaction is felt at the working of the units try various alterations, such as the values of grid leaks, oscillator coils, frame aerial windings, etc., until the very best results are obtained.

Last Unit

If this is done by next month, when we describe the third and last unit, the sensitivity of the first two units should be at their highest, and with the addition of the third unit—the low-frequency amplifier—the result should be a receiver which for sensitivity and selectivity, combined with extreme ease of control, is almost unbeatable.



Layout and Wiring Diagram of the I.F. Amplifying Unit of the Cosmopolitan Nine.

Jottings on the Month's Progress

Multi-stage Valves

AN interesting type of "complex" valve is being developed by Dr. Siegmund Loewe, the well-known German radio engineer. Instead of limiting the internal electrodes to the usual plate, filament, and one or two grids, Dr. Loewe employs two separate sets of electrodes, coupled together by a resistance-capacity unit, the whole of the parts being enclosed in a single evacuated tube.

In effect he houses a complete two-stage amplifier inside a single glass bulb. Apart from considerations of compactness and economy, such a self-contained unit is particularly suitable for short-wave reception. The external wiring is obviously reduced to a minimum, so that all stray capacity losses due to this cause are eliminated.

The coupling resistances are of a novel kind, being formed by depositing a metallic film on the surface of a rod or core of glass. They are absolutely non-inductive, and as they are enclosed inside the tube are not subject to variation by atmospheric changes.

Finally, they are stated to be quite free from "residual-voltage" effects, which in the ordinary way prevent the successful use of resistance-capacity couplings for short-wave reception.

* * * *

Sensitivity of Selenium

One of the difficulties in utilising selenium, particularly for television work, lies in the fact that it is normally somewhat sluggish in its response to a rapidly-varying light impulse. Mr. Thorne Baker has recently pointed out that the "lag" effect practically disappears if the cell is placed across an alternating source of current, instead of the usual battery. In these circumstances selenium will respond with extraordinary celerity to successive changes in illumination.

On the other hand, Professor Rankine attributes the sluggish response of an ordinary selenium cell to the presence of a small film of moisture between the electrodes. This film can be removed by exposing the cell for some considerable time to the action of a drying agent, after which a pronounced increase in sensitivity is obtained even when an ordinary direct-current battery is employed.

The chief interest in both discoveries lies in the fact that they tend to bring the problem of television so much nearer solution.

* * * *

Darimont Battery

This is an interesting departure from the ordinary type of primary cell and should prove distinctly useful to those who have no convenient means for recharging accumulators. The unit is somewhat similar in appearance to the ordinary dry cell, and consists of a glass container with a central porous pot and two carbon electrodes.

The first charging "ingredient" is a substance called "radiogene" which is dissolved in lukewarm water and poured into the outer glass case. The second ingredient or "exciter" consists of a thick grey fluid which is poured into the centre pot. A zinc electrode is then inserted and the cell is ready for action.

In the case of the ordinary dry cell once the depolariser is exhausted the unit is finished and may as well be thrown away.

With the Darimont, however, all that is needed is to replenish the outer and inner cells, and the zinc electrode from time to time, and the cell is restored to normal. The cost of "recharging" a fifteen ampere-hour unit amounts to a shilling.

* * * *

Another Death Ray

The use of ether waves in one form or another as a lethal weapon, capable of destroying objects such as aircraft—or human life—at a distance, appears to be a perennial source of inspiration to inventors. The latest recruit to this field of endeavour is M. Lucien Levy, the well-known French radio expert and the inventor, amongst other things, of the method of supersonic reception.

As might be expected, M. Levy's plan is distinctly ingenious and original. Up to the present it has not proved possible to transmit a concentrated ray of powerful ether waves, capable of doing damage at a distance, by using beam aerials or other known systems of directional transmission. Such methods are only feasible with short-wave radiation of comparatively limited power.

To overcome this difficulty the French inventor first sets up a "carrier" system of sound waves created by a special kind of gun, capable of being aimed at any given target. Having thus created a series of air-compressor waves between the gun and the distant target, powerful electric charges are imposed upon the alternate layers of compressed and rarefied air, and are thus propagated outwards by electrostatic induction.

Such a method of transmission may appear somewhat fantastic at first sight, but it is certainly quite as practicable as any other method of producing a death ray yet put forward.

It will be interesting to watch future developments, particularly in view of the high reputation borne by the inventor of the new system.

* * * *

Beacon Stations

An official notice to mariners announces that an unattended fog signal controlled by wireless has been permanently established on Rosneath Beacon in the Firth of Clyde. The installation was put in for experimental purposes in January of this year, and the trials since carried out under actual working conditions have been so successful that the station has now been made permanent.

The use of wireless in this way makes it possible to erect unattended lighthouses and fog signals at many difficult situations or dangerous rocks where it is at present too expensive to provide keepers, or where it is impracticable on account of rocky bottom, strong tides, or rough seas to maintain a submarine cable connection for an unattended beacon station.

B. A. R.

Wireless Feminities

A GENERATION ago almost every flapper went through a trying (to parents and teachers) phase of being stage-struck. No career would suit the ambitious damsel but that of a second Ellen Terry. Of late years the same modest desire has been transferred to the film world, and bobbed young aspirants have contorted their countenances secretly before their mirrors trying to discover if they have film faces.

New Course of Training

I am wondering how the new course of training for broadcast players, as distinct from those on the stage, which starts this month at the Royal Academy of Dramatic Art, will affect this age-old yearning. Will it now become the thing for sweet sixteen to yearn after a dazzling career before the microphone?

One's first inclination is to retort "No." Acting in a broadcast studio is acting of a certain type, of course. But where would our impressionable little flapper be without lovely frocks, without scenery, without a visible audience cheering her on?

Then on second thoughts I remember that there is an increasing tendency to provide these accessories to give the necessary atmosphere, and probably in a few years' time the stage in a studio will be almost as complete and elaborate as in a theatre. So take heart of grace, all ye flappers!

* * * * *

Poet's Resurrection

Broadcasting has given a new lease of life to many people. We might include poets in the number. Poems are essentially best suited to be heard by the ear, rather than seen by the eye on a printed page, and if they can be transmitted by the voices of their creators, so much the better.

The old troubadours sang their verses to small audiences gathered in baronial halls. Modern poets may speak their masterpieces to immense numbers of people *via* the microphone, and it would be interesting and uplifting to have many such recitals in the programme.

Londoners who have visited the Thursday-evening poetry readings given at the Poetry Bookshop in Devonshire know well how alluring it is to hear verse well read by its writer or by a sympathetic spirit with a good voice.

The fact that the readings used to take place in a converted loft to which one climbed by a steep staircase rather added to their charm. The plain whitewashed interior had the right touch of austerity for John Drinkwater or Henry Newbolt reading his own poems.

* * * * *

Radio and its Cost

Cheap as listening-in is, its cost a year being infinitesimal compared with concerts, lectures or the pictures, I fancy that the many men who make a hobby of radio construction must find it an expensive pastime. Photography with a camera of any size has always ranked among the hobbies that run away with most money, but one wireless set after another, with the tools to make them, must eat into more cash, even allowing for the fact that many components can be used over and over again. Though no doubt the enthusiasts get excellent value for the money they expend, which, after all, is the main consideration.

* * * * *

Most women like to have something to do with their hands while listening-in—something which gives them a feeling of being usefully occupied and obviates the tendency to fidget, without interfering in any way with enjoyment of the programme.

It's not easy to find the ideal accompanying occupation. Needlework answers most requirements when listening to a loud-speaker, provided any cutting-out is done beforehand; but with phones on it is less satisfactory, as they must be taken off and part of the item missed on those occasions—which *will* crop up—when one has to cross the room to fetch scissors, tape measure or some other accessory not within reach of the hand. And machining is, of course, out of the question, on account of the noise it makes.

Knitting seems an obvious choice and has many advantages; but the click of steel pins is apt to prove distracting during a talk or the soft notes of a song; and I've yet to find the ball of thread that won't sometimes run away beyond the range of the phone leads. Again, there's much counting needed to get a pattern correct.

* * * * *

Weaving to Wireless

Just recently I've taken up weaving on a small table loom. Not only is it just as soothing and intriguing at the same time as knitting and crochet, but I've discovered it's an ideal accompaniment to listening-in.

The few accessories, consisting only of shuttle and thread, are easily collected beforehand and do not stray. The work is quite mechanical and does not prevent full enjoyment of the programme; there is no counting; and weaving is practically noiseless.

It seems to me many more women would take it up if they realised how easy and soothing it is, and how cheaply small table looms can be bought. The printed instructions sold with the loom provide all the lessons needed.

A. M. M.

SUPREME HEIGHTS

by Philip Austin

"WHAT is out there?" suddenly demanded Mrs. Pendlebury.

Her husband rose from his seat, went over and stood beside his wife, and gazed inquiringly out of the window.

The usual traffic was passing. Nothing out of the ordinary was happening. There was the customary bustle and activity. The policeman on point duty did not appear any different from any other policeman on point duty. The usual pedestrians sauntered or hurried along. There was absolutely nothing abnormal or extraordinary that Mr. Pendlebury could see. There was not even the shadow of an aeroplane in sight.

"I don't see anything wrong," observed Mr. P.

Mrs. P. seemed to awaken out of a trance.

"What did you say?" she inquired casually.

"I was observing that I did not see anything amiss," replied Mr. P.

"Oh, of course not. It is wonderful."

Mr. P. gazed at his wife. She looked sane. She wasn't excited. Nothing wrong that way. What was she staring at? What did she see that was wonderful? What was out there?

Mr. P. looked again. His wife was still gazing out of the window. Mr. P. became intrigued. He looked at the pavement. He looked at the roadway. He looked at the lamp-posts. He looked at the fronts of the houses opposite, and at the roofs.

What was wrong with his wife? What was she talking about? What was the sense of her remarks? What was the inference? On what had they bearing? What was the hidden significance?

Mrs. Pendlebury had relapsed into her former state of coma. It was as if Mr. P. did not exist. He felt uncomfortable. He did not like it. He felt an undoubted sense of irritation, almost of annoyance, if not of exasperation. He did not like being in the dark—that is, metaphorically speaking—of course, he was no longer a child—the night no longer held much terror for him. He wasn't exactly Peter Pan. But he was puzzled.

"Ah, well," said Mrs. P. at last, and sat down and gazed into the fire.

Mr. P. gazed also. It was a very good fire, nice and cheerful. It threw out a comforting heat. They were very good coals, Mr. P. thought to himself. Better than the last. Much better. There was very little white ash, when all was said and done. And few clinkers. Scarcely a slate either. On the whole Mr. P. considered that they had been fortunate. There would be very little cleaning up. Mrs. P. would be congratulating herself.

Seven o'clock struck. "Dear me," said Mr. Pendlebury. "Must hear the news." He adjusted the headphones.

Quietness reigned in the domestic circle whilst Mr. P. hearkened to the latest news. As he was a commercial traveller he was naturally interested in the weather forecast. He had found it pretty accurate of late. Guided by it he knew just how to array himself—it was a great asset to him.

True, it did not come on till 10 o'clock. But he liked the news anyhow. He wasn't much of a one for wading through newspapers. You got just what you wanted on the wireless. It was very handy. Besides you had to wait till the next morning for a newspaper weather forecast. It was a signal (Mr. P. did not intend any pun) advantage getting the report overnight. One could have everything cut and dried for the next day's journey.

Mr. P. laid down the phones. There being only one pair it was a recognised rule that, after the news, Mr. P. relinquished them and Mrs. P., who was fond of music, took them up.

On this occasion Mrs. P. did not stir. After a while Mr. P. became conscious of this. He looked towards his wife. She was sitting in the same attitude. She had not moved. She appeared engrossed. She still gazed at the fire. Mr. P. could not help marvelling at the strange effect these coals had on his wife. They appeared to mesmerise her.

The coals made a pleasant sound as they burned. There was very little smoke. They had reached that stage. They presented a grateful glow. Mr. P. thought with satisfaction of a horse he had backed that day—Ruddyglow. It was a soothing reflection. He felt cheery—like the coals. He wondered if there was anything good for to-morrow? . . .

His wife still stared into the fire. What possessed her? Surely she should be tired of looking at the coals ere this. Why didn't she listen-in? He was sure there was some good music on. There usually was. He didn't care much for it himself, but then tastes differed. What was one person's meat—well, he didn't mean that exactly.

It was all good. And cheap. It was dirt cheap. Well, what he meant to say was that it was more than reasonable. There was no gainsaying that. You couldn't get anything much cheaper. The commercial aspect of the matter appealed certainly to his business instincts. Short of getting something for nothing—well, there you were.

Like a person coming out of a dream Mrs. P. at length broke the silence.

"I wonder where all the music goes?" was what she said.

Mr. P. looked at her in astonishment.

"Where it goes?" he gasped. "You mean the wireless? Why, to earth, of course!"

"You mean it is buried," she said. "All that beautiful music? Nonsense."

"Oh, no," said Mr. P. "It returns through the earth. That is the connection. All sound does."

"I am not talking of sound. I am speaking of music—of heavenly music. *You* are thinking of noise."

"Tut-tut," said Mr. P. warmly. "It is the same thing. All——"

"Sometimes," said Mrs. P., "when I am listening to divine music I think it comes from somewhere outside this planet altogether—that it is a message from other worlds, could we but understand its purport, it's meaning, could we but grasp——"

"But it is made here," broke in Mr. P. "It is made in the studio

it is made in the theatres, in the concert halls, in the—in the hotels——"

"Bosh!" said Mrs. P. "You don't understand. You have the finite mind. You are clogged. You are warped. You have not the mind's eye. *You* only see what you look at. Do you see anything there?"

"Where?" asked Mr. P

"In the fire," rasped Mrs. P.

Mr. P. glared helplessly.

"Of course I do," he said. "I see—I see the fire."

"You see coals there," insisted Mrs. P. "Don't deny it. Admit you see coals?"

"And very good coals too," agreed her husband.

"I thought so," said Mrs. P. triumphantly. "You have no soul. You are outside the pale."

"You mean the palings?" ventured hubby.

Mrs. P. scorned any reply to this flippancy.

"Do you ever look at the stars?" she asked.

"Certainly," replied Mr. P. "Often, in fact. And the moon, too."

"What do you think of them?"

"Oh, they are all right in their place."

"And is that all you think of them? Do you never think of space—of its immensity—of the miserable worm you are in comparison? Have you no vision? That is what I mean by 'out there.' But this has no significance for you. Wireless is wasted on you. It's mystery does not appeal. Of its possibilities you can have no conception. You are ignorant, densely ignorant of this stupendous, leaping, bounding, vaulting miracle. Do you know where you are going? Do you know whence you came? No. You are sufficient to yourself. You are a type. Oh, you are a type. Have you no mind?" . . .

But it was here that Mr. Pendlebury, insignificant though he might be in comparison with the universe, emblematic perhaps of a type not of much account in the scheme of things in a highbrow sense, albeit a staunch and loyal supporter of modern progress in the shape of wireless, rose to supreme heights.

"Anyhow," he said, "I pay for the licence!"

TAKING CARE OF YOUR ACCUMULATOR

IF I had a few hundred pounds to invest I should put it into an accumulator business.

Thousands of accumulators must be ruined every year by bad charging and faulty electrolyte. Of course, those who send their cells to be charged at a charging station, where they can have professional attention are quite safe, but what about those amateurs who charge their own.

Perhaps a few hints to these home chargers will not be amiss.

Mixing the Acid

One of the most important points is the mixing of the sulphuric acid which is to be used in the accumulator. If the greatest care is not taken, certain necessary precautions are overlooked, or if the correct specific gravity is not obtained, it is quite likely that a perfectly good accumulator will be hopelessly ruined.

Some people, when testing an accumulator which is on charge, use only the voltmeter; others only trouble to test with the hydrometer. There is only one correct way to test the accumulator, that is with both the voltmeter and the hydrometer.

Merely taking a reading of the density of the acid in the cell will not suffice, as if the water has evaporated to any great extent, or the acid has not been correctly mixed, the hydrometer will not give a reading which can be relied upon.

Perhaps this point has troubled some amateur chargers before now, so it may be well to give an instance. We will suppose that a battery has been on charge for a considerable time, and is giving a voltage of from 2.5 to 2.6 per cell, the electrolyte gassing freely. If the hydrometer reading gives a specific gravity of only 1220, we may take it for granted that the electrolyte is not correct.

Frequently, home chargers find that their accumulator will not function properly after a few charges. This may be due to a short-circuit between the plates, caused through the following circumstances: It sometimes happens that sufficient care is not taken when the proportions of acid and water are measured. If these proportions are incorrect there is a tendency for the paste in the plates to loosen and drop out, so causing a short between two plates.

Again, in an accumulator in which the proportion of water and acid is not correct, the risk of sulphating is considerably increased.

Now we come to an important point. The writer knows one amateur who, through carelessness in mixing the acid, nearly lost his sight. So, a word of warning. Be particularly careful that the acid is poured into the water. Do not adopt the opposite procedure.

When sulphuric acid and water are mixed together a great deal of heat is given off. It naturally follows that if a little water is added to a lot of acid, the amount of heat generated will be greater. This heat can, in fact, be so intense as to cause the acid to boil almost instantaneously, with the possible result that the person doing the mixing may receive some splashes of acid in the face or eyes, as happened to the amateur mentioned above.

Let it be repeated, therefore, that the only safe way of carrying out the mixing is to *pour the acid into the water*. The approximate proportions are one part of acid to four parts of water. Don't forget, too, that only distilled water should be used for this purpose.

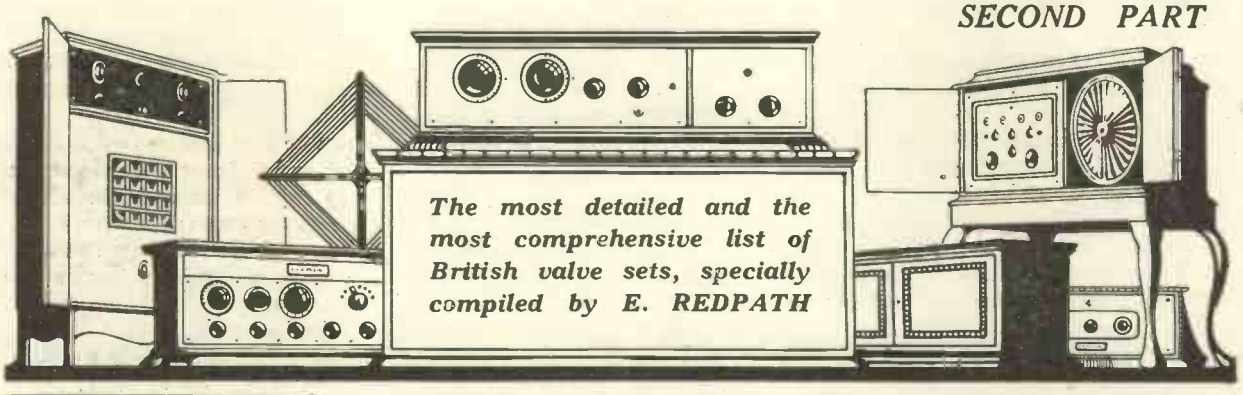
Incorrect Density

When the mixture has been allowed to cool off to its normal temperature, it may be found that the density is not correct. This may be remedied by the addition of very small quantities of water or acid, as required.

In conclusion, it is an excellent thing to empty the battery now and again, and give each cell a good cleaning out, with cold water. The time that is occupied by this procedure is not wasted. H. A. R.

Guide to the Best Valve Sets

SECOND PART



The most detailed and the most comprehensive list of British valve sets, specially compiled by E. REDPATH

IN order to make this guide as helpful as possible to each prospective owner of a set, a few preliminary remarks regarding the general characteristics and capabilities of the different *types* of set are given at the beginning of each section.

Conservative Estimates

Readers will appreciate that as reception conditions will vary considerably, a conservative estimate of performance is given, based upon average conditions—both atmospheric and geographical—and the use of an aerial-earth arrangement of average height and efficiency. Under favourable conditions the performances indicated will be improved upon quite readily.

To save space and needless repetition, a simple code will be employed to describe the different valve combinations; that is, HF—D—2LF represents a four-valve set having one high-frequency amplifying valve followed by a valve detector and two low-frequency amplifying valves. Similarly, C—LF represents a crystal detector plus one low-frequency amplifying valve. An asterisk (*) against or above one of the figures means that the valve so marked is "reflexed," and therefore functions in a dual capacity.

Prices

With a few exceptions, prices throughout are given in two forms. First, the price of the set alone (including Marconi royalty of 12s. 6d. per valve holder), as this will interest readers who already have phones or loud-speakers, batteries, valves, etc., and, secondly, an "all-in" price for the set (including royalties) and accessories, which will be specified as follows:—

A—Accumulator or suitable dry-cell battery.
B—High-tension dry-cell battery.
V—Valve or valves, as required.
E—Aerial equipment (included in some cases).
T—Telephones—one pair as a rule.
S—Loud-speaker.

Thus "Price £10" is the price of the particular set plus Marconi royalties.

SAVE YOURSELF TIME AND TROUBLE

by writing to US for further particulars of any sets in which you are particularly interested.

At the end of the description of each set you will see a reference number. If you are interested in several three-valvers, say, send us a postcard bearing your name and address and the numbers of the sets of which you require more details—we will see that the manufacturers do the rest.

If you do not see just the set you require described in this issue, remember

MORE SETS WILL BE DESCRIBED NEXT MONTH.

"Price (ABVS) £18" is the "all-in" price of set, royalties, L.T. battery, H.T. battery, valves, and loud-speaker.

Liable to Alteration

Although the greatest care has been taken in ascertaining the prices and in quoting them in a uniform manner in order to facilitate ready reference and comparison, the prices shown are not to be regarded as an offer or quotation by the manufacturers.

ONE-VALVE SETS

THIS type of set may profitably be installed in place of a crystal set where increased volume from the local transmitting station or the use of additional pairs of telephones is desired.

It will also enable satisfactory results to be obtained over much greater distances, say up to 50 miles from a main station and 100 miles from 5XX (Daventry).

Not recommended for use with a loud-speaker, but at distances not exceeding 4 or 5 miles a modest volume for a quiet room may be obtained from a small loud-speaker without undue use of the reaction or volume-control provided.

The initial cost of a set of this type is low; it is simple to operate and economical in upkeep. If a low-consumption valve is fitted, the filament may be heated by means of a suitable dry-cell battery or quite a small accumulator, which will not require recharging very frequently.

The high-tension battery need not, as a rule, exceed 45 to 60 volts, and should give satisfactory service for several months.

STERLING ANODION. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

Anodion One-valver.

The simplest of the Anodion series of desk-type sets, comprising a sloping ebonite panel carrying all terminals and operating controls, and mounted upon a polished walnut case. The standard "single-circuit-with-reaction" is adopted, but in this case a special reaction unit and switch enables a tuning range of 175/925 metres to be covered. Other interchangeable units are obtainable which increase the wavelength range to 7,600 metres if desired. Aerial and battery terminals are at back of panel and telephone terminals (two pairs) at front. A vernier knob on the tuning condenser facilitates the tuning-in of distant stations. The set gives excellent results upon telephones, and with a little care

several fairly distant stations can be received

Price £2-14-6.
All-in price (ABVT) £5-6-4.
Metal protecting cover 15/-.
Ref. W.M.104

SINGLE-VALVE AND CRYSTAL SETS

THE simplest arrangement (C—LF) consists of a crystal detector followed by a low-frequency amplifying valve, the object being to increase the volume of speech, music, etc., already receivable upon a crystal set alone. In most cases the owner of a crystal set purchases an amplifier as a separate complete unit and merely connects it to the existing set. A second arrangement, not often seen nowadays, consists of a high-frequency amplifying valve preceding a crystal detector, in order to afford telephone reception over comparatively long distances.

A further development is the utilisation of a single valve in a combination of the two methods referred to above. This is known as a single-valve reflex set (HF*—C), in which the one valve is caused to function as both high- and low-frequency amplifier, whilst the necessary rectification (or detection) is performed by a crystal in the usual manner.

This arrangement is probably the most economical form of one-valve set, enabling good volume to be obtained at considerable distances, for instance, up to 70 or 80 miles, using two or three pairs of telephone receivers.

Although not generally recommended for loud-speaker operation, a moderate volume may usually be obtained at distances up to 10 or 12 miles from a main broadcasting station (and perhaps 50 miles from Daventry), which is really a very good performance considering the modest first cost of apparatus and low running expenses.

B.T.H. Valve-crystal Reflex Set.

Accessories are specified as follows :—
A—Accumulator or suitable dry-cell battery.
B—High-tension dry-cell battery.
V—Valve or valves, as required.
E—Aerial equipment.
T—Telephones.
S—Loud-speaker.

B.T.H. VALVE-CRYSTAL. ***British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.***

HF*—C. A particularly neat and well-finished set in desk-type cabinet of polished walnut with hinged top. It enables loud and clear telephone reception to be obtained over long distances. The panels, control knobs, etc., are of the artistic chocolate-coloured insulating material characteristic of the B.T.-H. range of sets. Tuning controls are simple and conveniently placed, whilst the circuit arrangement employed gives a high degree of selectivity. A special feature is the protected dual detector with change-over switch. The H.T. battery is contained in the base of the cabinet. Additional inductance coils may be obtained to enable 5XX to be received, and the method of connecting these, together with all necessary details regarding the set, are given in an instruction booklet supplied with it.

Price £3-2-6.

Ref. W.M.109.

TWO-VALVE SETS

THERE are two familiar arrangements of this type of receiving set. The first comprises a high-frequency amplifying and a detector valve (HF—D) intended for long-distance telephone reception (say 150 miles from a main station).

The second, and much more popular arrangement, comprises a detector valve (provided with reaction or volume control), followed by a low-frequency amplifying valve (D—LF), and is capable of giving satisfactory loud-speaker results at distances up to 15-20 miles from a main station or 50-60 miles from 5XX.

It may be regarded as the simplest and most economical "home-entertainment" type of set—moderate in first cost, simple to operate and, with the provision of low-consumption valves, very inexpensive to maintain.

Where it is desired to obtain ample volume in two or more pairs of telephones, good reception may be obtained at distances up to 50-60 miles from a main station and a correspondingly greater distance from 5XX.

EDISWAN TOOVEE. ***Edison Swan Electric Co., Ltd., 123/5, Queen Victoria Street, E.C.4.***

HF*—D. A comparatively new model incorporating a two-valve reflex circuit, in which the first valve functions as both high- and low-frequency amplifier, the second valve being the detector. All controls, together with a master on-off switch are mounted upon a vertical panel

Ediswan Toovee Receiver.

which, in turn, is fitted to a well-finished cabinet having accommodation in the base for a high-tension battery. Aerial, earth, and accumulator terminals are arranged behind the cabinet, whilst removable panels (also at the back) afford access to valves, battery, etc. A wavelength range of 300 to 4,000 metres can be obtained by the use of range-blocks, which are required in duplicate (one for the aerial and one for the high-frequency circuit) and which fit into position at the rear of the cabinet. Altogether a neat and efficient set, combining sensitivity and fairly powerful reproduction with comparative simplicity in operation.

Price (including H.T. and grid batteries) £14-15-0.

All-in price (ABVET) £18-5-0.
Ref. W.M.226

BRITISH GENERAL. ***British General Manufacturing Co., Ltd., Tyrwhitt Road, Brockley, S.E.4.***

D—LF. Classified by the makers as Receiving Station No. 1, this well-finished set is offered complete with all necessary equipment. The set itself is of the open-front cabinet type, with valves and coils (plug-in) enclosed but accessible through the hinged lid. With the exception of terminals for phones and loud-speaker, connections are made to terminals at the back of cabinet. The installation and operation of the set are very simple, tuning being performed entirely by the single dial (with vernier) seen in centre of front panel. Both interesting and efficient is the special form of valve switching provided by means of the patented Autostat (made by the same firm), which functions

Guide to the Best Valve Sets *(Continued)*

British General Two-valver.

as filament rheostat and change-over switch simultaneously. Excellent loud-speaker results are obtainable over the usual ranges. Coils for normal broadcasting wavelengths are supplied as standard with each set, but by the use of additional coils any desired wavelength can be obtained. Alternative grades of equipment are obtainable, known as type A and type B respectively. The set is guaranteed for 12 months.

All-in price (A type equipment) £8-10-0.

All-in price (B type equipment) £13-10-0.

Also purchasable upon a convenient instalment plan. Particulars upon application to the manufacturers.

Ref. W.M.217

SIMPLON. ***Dargue Bros., Ltd., Simplon Instrument Works, Halifax.***

D—LF. A particularly neat desk-type set with hinged cover affording protection to valves and control panel, and comprising the standard two-valve circuit with plug-in tuning coils mounted in the holder upon the left-hand end of cabinet. A single dial, with vernier for fine adjustment, controls the tuning, whilst reaction or volume control is effected by means of the insulating knob attached to the two-coil holder. Designed for good quality loud-speaker reproduction at distances up to 25 miles from a main station and a correspondingly greater distance from 5XX.

Price £7-15-0.

All-in price (ABVES) £15-15-0.

Ref. W.M.218

Simplon Two-valve Receiver.

Accessories are specified as follows :—
A—Accumulator or suitable dry-cell battery.
B—High-tension dry-cell battery.
V—Valve or valves, as required.
E—Aerial equipment.
T—Telephones.
S—Loud-speaker.

GAMBRELL BABY-TWO. ***Gambrell Brothers, Ltd., 76, Victoria Street, S.W.1***

D—LF. Intended to enable loud-speaker results with good tonal quality to be obtained at considerable distances from a broadcasting station, this very compact two-valve set fulfils its purpose excellently. It is easy to operate, tuning being performed entirely by means of the large left-hand dial, whilst the volume is controlled

Gambrell Baby-two.

by movement of the central dial, and both valves are turned on or off and filament brilliancy regulated by the remaining dial. All connections are made to terminals at the back of the set, so that the lid of the cabinet may remain closed, affording complete protection to valves and other components, whether the set is in use or not. The cabinet, of wax-polished mahogany, measures only 10 in. by 6 in. by 6¾ in., and is substantially made. Satisfactory reception at distances up to sixty miles is claimed, and certainly, on actual test, at about 20 miles south-east of 2LO, more than ample volume was obtained, whilst Birmingham was listened to at quiet room loud-speaker strength one Sunday afternoon. After dark several Continental stations were tuned-in quite easily at fairly good loud-speaker strength.

Price £8-0-0.

Ref. W.M.220

GILLAN II. ***Gilfillan Bros., Ltd., 63, High Holborn, W.C.2.***

D—LF. A simple and easily operated set in open-front mahogany cabinet. All controls, which comprise tuning and reaction dials and two filament controls only, are mounted upon polished ebonite front panel, which also carries all battery terminals. Valves and coils (plug-in) are completely enclosed. Coils for long waves may be inserted in holders by raising the hinged lid. Separate filament control is provided for each valve, but adjustment of these is not at all critical. The set gives excellent

Gillan II Receiver.

results over usual distances. Dimensions —panel size 12 in. by 8 in.

Price £7-5-0.

All-in price (ABVET) £12-12-0.

Ref. W.M.202

MELLOWTONE. ***Midland Radiotelephone Manuf'rs., Ltd., Brettell Lane Works, Stourbridge.***

D—LF. A well-finished set of the box type with ebonite top panel carrying all terminals, valves and controls. It is simple to install and operate, the initial and maintenance costs are moderate, and satisfactory loud-speaker reception over distances of 20-30 miles from a main station can be obtained upon a reasonably efficient aerial. The main dial with vernier knob, shown on the left-hand side in the accompanying illustration, effects the necessary tuning adjustments, in conjunction with the special " plug-in " unit seen in the centre. Reaction control is also provided for in the coil unit.

Mellowtone Two-valver.

The remaining control is simply a filament rheostat controlling the two valves.

Price £8-15-0.

All-in price (ABVS) £17-10-0.

Ref. W.M.228

MARCONIPHONE V2. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

HF*—D. This is a long-range receiving set in which one of the valves is reflexed (this is, made to function as both H.F. and L.F. amplifier), thus yielding results comparable to an ordinary three-valve set.

Marconiphone V2 Set.

It also enables good results to be obtained upon a short or temporary aerial. Wavelengths up to 3,000 metres may be received by the use of interchangeable range-blocks and reaction units, the unit necessary for reception of normal broadcasting wavelengths being supplied with the set as standard. A special feature is the use of a rotary form of "spade" tuning which proves very efficient. The set is compact, easy to operate and, when not in use, may be completely closed and so is protected from dust or accidental damage. This set is also supplied with strong canvas carrying case for easy transport. (See under Portable Sets.)

Price £5-5-0.
All-in price (ABVT) £8-0-0.
Ref. W.M.207

MAGNUM STRAIGHT-TWO. ***Burne-Jones & Co., Ltd., 296, Borough High Street, S.E.***

D—LF. A straightforward box-type two-valve set with flat ebonite top mounted upon a dark oak cabinet, all terminals, valves, control dials, and two-coil holder being carried upon the top panel. Adapted for loud-speaker reception at distances up to 20-25 miles from a main station and correspondingly greater distance from 5XX. Extended wavelength range may be obtained by the use of additional plug-in coils. A switch is fitted so that, once adjusted to the desired station, subsequent operation of the set merely involves switching on or off.

Price £5-2-6.
All-in price (ABV only) £7-5-0.
Ref. W.M.230

Magnum Straight-two Receiver.

C.A.C. DUO-VALVE MAINS RECEIVER. ***C.A.C. Valve Distributing Co., Ltd., 10, Rangoon Street, E.C.3.***

D—LF. This set is an up-to-date development of the same firm's Duo-valve set, incorporating the necessary equipment to enable it to be used upon the house-lighting system (provided that same is *direct* current) by merely fitting an adaptor plug into the most convenient light socket. No batteries or accumulator are required. Additional controls will be noticed upon the front panel, these being in connection with the mains equipment and including a main switch, so that, when once the tuning has been adjusted to receive from the desired station, the set may be put into or out of operation merely by movement of this switch.

C.A.C. Duo-valve Mains Set.

Substantially built and well finished, this set is an excellent example of the battery-less loud-speaker receiving set.

All-in price (valves, coils and loud-speaker) £18-7-6.
Ref. W.M.232

BRITISH GENERAL. ***British General Manufacturing Co., Ltd., Tyrwhitt Road, Brockley, S.E.4.***

D—LF. This set, known by the makers as their Receiving Station No. 2, incorporates the panel and circuit arrangements of their popular two-valve set (Station No. 1), but is fitted complete in a well-made and ornamental cabinet. Space is provided in the base of the cabinet for stowage of both H.T. and L.T. batteries, whilst the double doors enable the set to be shut up and locked when not in use. A very compact and efficient receiving station for satisfactory loud-speaker reception over the usual ranges. Full particulars of this and other sets, with details of a convenient deferred payment scheme, are given in an illustrated booklet, obtainable, free, upon application to the makers.

All-in price (ABVES) £12-10-0 (or with superior quality equipment) £17-10-0. Ref. W.M.231

British General Two-valver.

CARPAX. ***Carpax Co., Ltd., 312, Deansgate, Manchester.***

D—LF. Ease of operation, neat appearance and all-round efficiency, have been kept well in mind in designing this useful home-entertainment receiving set. Tuned by means of a single dial and provided with filament control for each valve and plug-and-jack connections for telephones or loud-speaker, the complete set is mounted in a black, pebble-grained cabinet of the open-front type, and is claimed to give satisfactory loud-speaker results up to 30 miles from a main station and 100 miles from Daventry,

Carpax Two-valver.

and at much greater distances on telephones. A mahogany cabinet can be supplied at a small extra cost (5s.).

Price £5-15-0.
All-in price (ABVT) £9-13-6.
Ref. W.M.219

GAMBRELL BABY GRAND. ***Gambrell Brothers, Ltd., 76, Victoria Street, S.W.1.***

D—LF. This two-valve set, a development of the Baby-two receiver, operates without battery or accumulator, obtaining all necessary current from the house electric light supply which, however, must be of the *direct-current* type. The actual tuning operations and results obtainable compare with the earlier model referred to above, but for all who have no knowledge of electrical matters the extreme simplicity of connecting the set to the most convenient electric-light socket by means of the neat flexible lead supplied and putting the set into or out of action

If you want further particulars of any of these sets send a postcard to US and save yourself trouble

Guide to the Best Valve Sets *(Continued)*

Gambrell Baby Grand.

by merely turning the wall-switch, will have a distinct appeal. The additional apparatus, which enables the batteries to be dispensed with, is enclosed along with valves, coils, etc., in a mahogany cabinet measuring only 10 in. by 7½ in. by 7½ in., and the cost of operating for three hours daily averages about threepence per week.

Price (including valves, coils for long and short waves, flexible lead with adaptor, and Marconi royalty) £17-0-0.
Ref. W.M.221

THREE-VALVE SETS

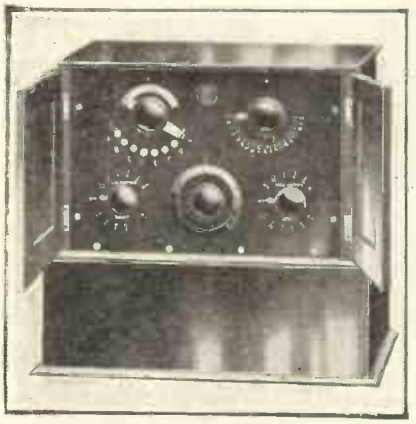
OF three-valve receiving sets there are three serviceable types available. First, the arrangement consisting of two high-frequency and a detector valve (2HF—D), which is particularly suitable for selective long-distance reception on telephones, but not really suitable for loud-speaker operation. Performance of this kind is not in any great demand, and accordingly not many sets are manufactured with this circuit arrangement.

Secondly, there is the combination of detector valve (with reaction), followed by two low-frequency amplifying valves (D—2LF), which gives powerful loud-speaker results from a main station within 50 or 60 miles and, with careful adjustment, reasonable loud-speaker volume over much greater distances. Satisfactory reception from Daventry is obtainable up to 200 miles, whilst the operation of this type of set is quite as simple a matter as in the case of a single-valve-with-reaction receiver.

The third arrangement, which may be considered the average of the first and second above mentioned, comprises one H.F. valve, detector valve and L.F. valve (HF—D—LF). The high-frequency valve ensures satisfactory range and increased selectivity, and the low-frequency valve following the detector ensures a strength adequate in most cases for good loud-speaker volumes at distances up to 100/120 miles from a main broadcasting station and 200/250 miles from 5XX.

It is to be noted that this type of set will permit a selection of programmes to be received provided that (a) the receiver is situated at least a few miles from the local broadcasting station, and (b) that the difference in wavelength between the local and the desired station is sufficiently great for the degree of selectivity provided in the set.

Accessories are specified as follows :—
A—Accumulator or suitable dry-cell battery.
B—High-tension dry-cell battery.
V—Valve or valves, as required.
E—Aerial equipment.
T—Telephones.
S—Loud-speaker.



R.I. Three-valve Set.

R.I. ***Radio Instruments, Ltd., 12, Hyde Street, New Oxford Street, W.C.1.***

D—2LF. A neat and powerful set, capable of receiving on wavelengths from 300 to 4,000 metres without the use of plug-in coils of any type. The loud-speaker reproduction is of excellent quality and adequate volume over the usual distances. The complete assembly is mounted in a polished mahogany cabinet, the vertical control panel being protected when the set is not in use by double doors hinged on each side of cabinet. Valves are completely enclosed and, if desired, a suitable pedestal base can be supplied to accommodate high-tension batteries.

Price £16-17-6.
All-in price (ABVT) £23-2-0.
Ref. W.M.308

ETHOPHONE III. ***Burndept Wireless, Ltd., Aldine House, Bedford Street, W.C.2.***

D—2LF. A compact, easily operated and efficient family set for loud-speaker reception. It is switched on or off by means of a small lever switch which also effects the change-over from the 200-500

Ethophone III Receiver.

metre range of wavelengths to the 750-2,000 metre range, which includes practically all broadcasting stations. There are no loose coils, as all necessary inductances are incorporated in the set. The left-hand dial is the station selector, and that on the right the volume control, both dials being provided with a suitable reduction gear (7 to 1) to facilitate adjustment. The five-point selector switch (upper left-hand corner of panel) enables increased selectivity to be obtained in situations where interference is experienced. The valves are enclosed and completely protected, but are readily accessible through the hinged lid of the cabinet.

Price (including 3 valves) £24-7-6.
All-in price (ABVES) £37-3-0.
Ref. W.M.304

Sterling Cabinet Set.

STERLING CABINET RECEIVER. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

D—2LF. This set has been specially designed for loud-speaker reception, with excellent tonal quality, from the local station. It incorporates the general circuit arrangement of the two-valve Anodion receiver, with an additional power amplification stage, the well-known Ideal transformers being employed. A switch enables the last valve to be cut out when desired to use telephones on two valves only, or when the volume with three valves is too great. The Sterling reaction unit is fitted, covering a wavelength range of 275-925 metres which, by the use of additional units, may be extended to 7,600 metres.

Fitted complete in a polished mahogany cabinet with double doors, which afford complete protection to the control panel when the set is not in use. A battery base, to accommodate H.T. batteries, can be supplied as an extra if desired. Altogether a very serviceable and neat family receiver, calling for little or no skill in operation and inexpensive to maintain.

Price £16-11-6.

All-in price (ABVT) £23-17-2.

Ref. W.M.318

MAGNUM STRAIGHT-THREE. *Burne-Jones, Ltd., 296, Borough High Street, S.E.1.*

D—2LF. A popular three-valve set constructed of good quality components and capable of very satisfactory performance, although offered at a low price. It is simple to operate and the arrangement

Magnum Straight-three.

adopted ensures good quality of reproduction rather than great volume. Coils for the normal broadcasting wavelengths (300-600 metres) are supplied. Additional wavelength range may be obtained by the use of additional plug-in coils, which may be of any standard type.

Price £6-17-6.

All-in price (ABV only) £8-0-0.

Ref. W.M.310

BRITISH GENERAL. *British General Manufacturing Co., Ltd., Tyrwhitt Road, Brockley, S.E.4.*

D—2LF. This set, complete with equipment, forms Receiving Station No. 3, and is a well-built set in open-front oak cabinet, with all valves and coils enclosed but readily accessible through the hinged lid. The circuit arrangement adopted, together with the patented Autostat filament control, simplifies the operation of the set and, at the same time, enables one, two, or three valves to be used merely by turning off the unwanted valves. This action automatically switches the phones or loud-speaker into the output circuit of the last active valve. All tuning is carried out on one main dial, provided with a vernier knob for fine adjustment, whilst a separate knob below the main dial gives control of reaction. All terminals for battery connections, etc., are at the back of cabinet. Ample loud-

British General No. 3 Three-valver.

speaker volume, together with clarity of reproduction, is obtainable over the usual ranges. As with other British General receivers, prices are quoted with alternative quality of accessories. Satisfactory results are obtainable with either equipment, however, and a twelve months' guarantee is given with each set.

All-in price (A equipment) £11-10-0.

All-in price (B equipment) £15-17-6.

Ref. W.M.313

GILLAN LG III. *Gilfillan Bros., Ltd., 63, High Holborn, W.C.2.*

D—2LF. A de luxe all-enclosed cabinet set embodying the circuit arrangement of the Gillan III, referred to later on. An additional feature is the provision of plugs and jacks further to simplify the connecting up and operating of the set. Insertion of the loud-speaker plug (or phone plug as the case may be) into the appropriate jack switches on the valves and affords a choice of two- or three-valve strength. Tuning is performed by adjusting one dial only, subsequent movement of a second knob giving desired reaction or volume control. Both controls and jacks are carried upon a vertical panel fitted behind the double doors of the cabinet, which is substantially built in oak or mahogany, and has space provided in the base for stowage of batteries. The set is not intended for

Gillan Cabinet Three-valver.

long-distance reception but, on actual test, great volume and excellent tone were obtained from the local station with a minimum of adjustment.

Price £14-9-6.

All-in price (ABVET) £19-10-0.

Or in Oriental lacquer cabinet £3-3-0 extra.

Ref. W.M.307

BRITISH GENERAL RECEIVING STATION No. 5. *British General Manuf'g. Co., Ltd., Tyrwhitt Road, Brockley, S.E.4.*

D—2LF. A well-built straight three-valve receiving set mounted complete in a highly polished mahogany cabinet. A hinged lid affords access to the interior for changing valves, coils, etc., the double doors enable the set to be shut up entirely when not in use and, in the

British General No. 5 Three-valver.

base of the cabinet, accommodation is available for all batteries. The excellent results obtainable are due largely to the use of satisfactory components, including the well-known U.S. transformer made by the same firm, whilst the operation of the set is certainly simplified by the Autostat filament control system which enables one, two or three valves to be used as desired. The loud-speaker reception range is 70-90 miles from a main station and 150-200 miles from the high-power station. Supplied complete with best quality accessories, this set is easy to install and forms an excellent home-entertainment receiving station.

All-in price (ABVES) £27-17-6.

Ref. W.M.315

GILLAN III. *Gilfillan Bros., Ltd., 63, High Holborn, W.C.2.*

D—2LF. A very serviceable home-entertainment type of set, simple to operate and incorporating a master switch by means of which, once the local station has been tuned-in and the tuning controls left adjusted, putting the set into or out of operation, either on two or three valves, is the simplest possible operation. Ample loud-speaker volume is readily obtainable at the usual receiving range. All terminals, with the exception of two for loud-speaker leads, are at back of the cabinet. The cabinet itself, obtainable in polished oak or mahogany, has a good appearance;

Guide to the Best Valve Sets *(Continued)*

Gillan III.

whilst valves and coils (plug-in) are completely enclosed. By the use of suitable coils, various ranges of wavelengths may be covered.

Price £12-7-6.
All-in price (ABVET) £18-12-6.
Ref. W.M.301

FOUR-VALVE SETS

ALTHOUGH several combinations of valves are possible in a four-valve set, experience and popular demand have resulted in one particular type being made almost exclusively.

This is a set comprising one high-frequency amplifying valve, detector valve and two low-frequency amplifying valves, and usually provided with some form of switching arrangement so that the last valve may be cut out of circuit when adequate volume is obtainable upon three valves.

For the user who desires a selection of programmes from British and Continental stations at good loud-speaker strength, with occasional full-strength dance or outdoor music from the local station or Daventry, this type of four-valve set is thoroughly recommended. Its operation does not call for any special skill as the controls usually do not exceed two dials (for tuning purposes) and some form of volume adjustment.

If used in conjunction with a reasonably good aerial-earth system, good loud-speaker volume may readily be obtained at distances up to 100-150 miles from a main station and about 300 miles from Daventry.

STERLING FLOOR CABINET. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

211F—D—LF. The Sterling four-valve receiver and Primax loud-speaker combined in a particularly handsome walnut cabinet. All batteries are contained within the cabinet and all controls are readily accessible from the front. As with the standard receiver, a wavelength range of 40-5,000 metres is available, if required. Complete protection to control panel and loud-speaker diaphragm is afforded by the double doors hinged on the right and left of the cabinet front.

Price (complete, ABVT and S) £69-7-0. Ref. W.M.411

Accessories are specified as follows :—
A—Accumulator or suitable dry-cell battery.
B—High-tension dry-cell battery.
V—Valve or valves, as required.
E—Aerial equipment.
T—Telephones.
S—Loud-speaker.

Sterling Four-valve Floor Cabinet.

MARCONIPHONE VB4. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

HF*—D—2LF. This instrument combines a selective two-valve reflex receiver and a two-valve power amplifier, and is particularly suitable for loud-speaker operation over considerable distances. No interchangeable coils are required, as tuning over a wavelength range of 300-4,000 metres is performed by means of two special selector switches designed so as to prevent losses due to unused turns of wire on the tuning inductances (known as dead-end effect). An efficient rejector is fitted, by means of which interference is prevented, even from a nearby station. Switches enable two, three, or four valves to be used as required, and also permit an easy change-over to telephones or loud-speaker. Space is provided in the base of the mahogany cabinet in which the complete set is housed, for stowage of H.T. battery, access to same and to the back of the instrument being gained through a door in the rear. An exceptionally fine set, comparatively simple to operate and highly efficient.

Price £27-10-0.
All-in price (ABVT) £37-0-6.
Ref. W.M.406

Marconiphone VB4 Receiver.

MAGNUM - DE - LUXE. ***Burne-Jones Co., Ltd., 296, Borough High Street, S.E.1.***

HF—D—2LF. A high-class receiving set in Jacobean oak cabinet with two pairs of double doors. The receiving set itself, with vertical ebonite panel, is fitted to the upper part of the cabinet, the space beneath, enclosed by the lower doors, providing ample accommodation for all batteries, spare coils, or other accessories. Simplicity of operation and ample volume with purity of reproduction have been specifically aimed at. The sensitivity is considerable, however, so that quite satisfactory results may be obtained by flat-dwellers or others who cannot erect the orthodox outdoor aerial. In such cases, an indoor aerial is recommended, or, if within a few miles of the broadcasting station, a frame aerial may be used.

Magnum Four-valve Cabinet Set.

All-in price (ABVT and S) £42-10-0.
(Or, with remote-control equipment) £47-10-0.
Ref. W.M.412

ETHOPHONE V. ***Burndept Wireless, Ltd., Aldine House, Bedford Street, W.C.2.***

HF—D—2LF. This set is a natural and most useful development of the three-valve Ethophone III, made by the same firm. The cabinet is somewhat larger and is provided with doors which completely enclose the front panel carrying the control dials. An additional low-frequency amplifying valve is included, controlled by means of a master-switch

Ethophone V Receiver.

which also puts the entire set into or out of use. Excellent loud-speaker results can be obtained upon quite a small indoor aerial (at distances up to 20-25 miles), whilst upon a good outdoor aerial ranges up to 150-200 miles can be covered. Most British and several Continental stations are, therefore, within normal receiving range. Altogether efficient and well-finished, each set is supplied complete, with instruction booklet, and is covered by a 12 months' guarantee. Full particulars are obtainable from an illustrated booklet supplied free on request.

Price (including Burndept valves) £37-10-0.
All-in price (ABVET and S) £50-5-6.
Ref. W.M.402

MELLOWTONE. ***Midland Radio-telephone Manuf'rs., Ltd., Brettell Lane Works, Stourbridge.***

HF—D—2LF. A handsome, all-enclosed cabinet receiver, made essentially for the home drawing-room, and ensuring adequate loud-speaker volume together with good reproduction. This latter quality is specially provided for by the tone-control device incorporated in the set, giving soft, normal, and mellow results. The illustration shows the popular model in polished dark oak cabinet with oxidised fittings, the dimensions being 26 in. (high) by 23 in. by 14 in. Tuning is effected by means of two main dials embodying a 100-to-1 reduction gear, one of these being calibrated for several broadcasting stations by the makers. The wavelength range obtainable is 150 to 2,000 metres. A switch is provided to enable the last valve to be cut out of circuit when not required, and this, together with the reaction control enables practically any desired volume or strength to be obtained. External connections are reduced to four, i.e., aerial, earth, and loud-speaker, all batteries being stowed out of sight in the base of the cabinet.

Price £24-0-0.
All-in price (ABVS) £38-5-0.
Ref. W.M.414

Mellowtone Four-valver.

GECOPHONE CABINET SET WITH LOUD-SPEAKER. ***General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.***

HF—D—2LF. This is a completely self-contained receiving set designed to meet a demand for efficient and easily operated loud-speaker equipment, combined with neat and decorative appearance. All valves and components are fitted behind the vertical ebonite panel of the receiver itself, which is identical with the Table Model Four-valve set already described. Batteries and loud-speaker are contained in the lower portion of the cabinet, thus obviating the necessity for external connecting wires other than aerial and earth leads. The wavelength range is 260-2,000 metres, a set of coils and reaction units being supplied for wavelengths above 500 metres. Low-consumption valves are recommended and included in the equipment supplied, enabling approximately 75 hours working to be obtained at each charge of the 2-volt 70-ampere-hour accumulator. A voltmeter fitted to the front of the set indicates the condition of the high-tension batteries. The overall dimensions of the complete set are as follows: height, 3ft. 9 in. by 25 in. by 18 in. the cabinet itself being of selected mahogany, highly polished.

Gecophone Four-valve Cabinet Set.

All-in price (ABVS and extra coils) £60-0-0. Ref. W.M.417

STERLING ANODION LONG-RANGE. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

2HF—D—LF. A very sensitive four-valve set capable of loud-speaker reception at moderate strength from stations at considerable distances, and of very pure reproduction from the local or nearest station. The normal wavelength range is 300-550 metres, but, by means of interchangeable units, tuning can be effected over a range of 40-300 metres, or extended, by means of additional coils, to 5,000 metres. Thus a complete and rather unusual wavelength range of 40-5,000 metres is obtainable. All controls and terminals are carried upon the sloping ebonite panel, characteristic of the Anodion range of sets.

Anodion Long-range Four-valver.

Price £17-4-0.
All-in price (ABVT) £24-9-2.
Ref. W.M.408

ETHOPHONE V POPULAR. ***Burndept Wireless, Ltd., Aldine House, Bedford Street, W.C.2.***

HF—D—2LF. The Ethophone V, as described opposite, is also obtainable in a popular or medium-priced model, differences being in the cabinet work, the omission of super-vernier dials, special instrument leads, and the use of coils without moulded cases. Apart from these points the set is quite as efficient as the higher-priced models.

Ethophone V Popular Model.

Price (including valves) £32-10-0.
All-in price (ABVET and S) £45-5-6.
Ref. W.M.404

STERLING LONG-RANGE CABINET. ***Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1.***

2HF—D—LF. This set comprises the circuit arrangement of the Anodion four-valve long-range receiver, assembled in a smart table cabinet provided with double doors, which afford complete protection

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Guide to the Best Valve Sets *(Continued)*

Sterling Long-range Cabinet Set.

to the panel and controls, when the set is not in use. If desired, a wooden plinth or battery base, to correspond with the cabinet, may be obtained. This not only houses the batteries but adds considerably to the appearance of the complete set.

Price £21-8-0.
All-in price (ABVT) £28-19-8.
Battery base (extra) £2-5-0.
Ref. W.M.409

PORTABLE RECEIVING SETS

IN this section have been included all types of sets with real claims to *portability*, whether completely self-contained (that is, with batteries, frame-aerial and loud-speaker all fitted into one case), or intended for use with a small, temporary outdoor aerial and/or separate and external loud-speaker.

The degree of portability desired by users or prospective users, the circumstances in which sets are to be used, and the class of results desired, vary over wide limits, but, for the purpose of this guide, only sets which may be carried complete, including all valves and batteries—even though not actually assembled as one unit—properly protected and provided with convenient means for carrying, are considered as portable sets.

The range extends from one-, two-, and three-valve sets to eight-valve superhet sets, so that no general indications of range, etc., can be given in this preliminary note.

To facilitate reference, however, the following simple classification has been adopted, and the class letter will be found after the title of each receiving set.

Sets entirely self-contained, with valves, batteries, frame aerial, and loud-speaker ...CLASS A.
Sets complete with valves, batteries and frame aerial but for use with external loud-speaker ... ...CLASS B.
Sets complete with valves and batteries, but for use with temporary outdoor aerial and external loud-speaker ...CLASS C.
Sets complete with valves and batteries, but for use with temporary outdoor aerial and phones only ... ...CLASS D.

Accessories are specified as follows:—
A—Accumulator or suitable dry-cell battery.
B—High-tension dry-cell battery.
V—Valve or valves, as required.
E—Aerial equipment
T—Telephones.
S—Loud-speaker.

HALCYON. *Halcyon Wireless Supply Co., Ltd., 110, Knightsbridge, S.W.1.*

HF—D—2LF (Class A). Made in two models, a four- and a five-valve set respectively, this set is completely self-contained. Valves, batteries, and a very

Halcyon Portable Receiver.

serviceable loud-speaker are all assembled within a smart oak cabinet, provided with carrying handle, and measuring overall 15 in. by 14 in. by 8½ in. The object has been to offer a set which, whilst portable enough to be taken outdoors, has a sufficiently attractive appearance to perform in the drawing-room or elsewhere indoors. Simplicity of operation has also been kept in mind, the tuning adjustments are easily made and, subsequently, a simple switch controls the entire set. Using only the concealed frame aerial, a range of 20-30 miles is claimed for the four-valve set and 40-50 miles for the five-valve model. These distances are from a main station. In the case of 5XX, reception up to 150 and 200 miles, respectively, is stated to be possible. The weights of the two models are about the same, namely, 30 lb.

All-in price (4-valve set) £28-10-0.
All-in price (5-valve set) £38-2-6.
Ref. W.M.604

B.T.H. THREE-VALVE PORTABLE. *The British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.*

Super-het (Class B). A well-finished and efficient set, intended for phone reception at distances up to 30-40 miles from a main broadcasting station and 100-120 miles from Daventry. Everything necessary, except the phones, is contained in a neat leatherette-covered case, with convenient handle for carrying, the total weight being 23 lb. Upon the top of the case a compass is provided to facilitate the directional setting of the

B.T.H. Portable Super-het.

internal frame aerial, whilst a jack is also fitted to take a large external frame aerial in order to increase reception range. The large frame aerial is collapsible, and is carried separately in a neat canvas case. To obtain still further increase in receiving range, an ordinary or temporary outdoor aerial may be used in conjunction with a special coupling coil. There are two tuning and two volume controls, with a master on-off switch and simple change-over switches for the different wavelength ranges. With each set is supplied a chart showing tuning adjustments and a particularly useful instruction booklet. On test the set performed well, good telephone strength, with excellent quality, being obtained. For loud-speaker results at the distances above mentioned, a companion unit, the B.T.H. loud-speaker

B.T.H. Portable Amplifier and Loud-speaker.

and two-valve amplifier, is supplied, complete in similar transport case.

All-in prices (Three-valve portable set), £21-17-6. Loud-speaker and amplifier set, £16-5-0. Ref. W.M.607

MARCONIPHONE V2. *Marconiphone, Co., Ltd., 210/212, Tottenham Court Road, W.1.*

HF*—D (Class C). This outfit comprises the two-valve reflex receiver with equipment as described and illustrated in the two-valve section. The cabinet, however, is adapted to contain the necessary batteries, and the whole packs neatly into a strong canvas carrying case, together with aerial, earth-lead, and phones.

All-in price £10-18-0.
Ref. W.M.607

Marconiphone V2 Portable Set.

SUPER-HET SETS

THE comparatively rapid development and increasing popularity of super-het sets (or, to give them their full title, supersonic-heterodyne sets) is indicated by the fact that there are now a dozen or more makes available at prices ranging from £25 to £140.

The special claims and advantages of this type of set may be summarised as follows :—

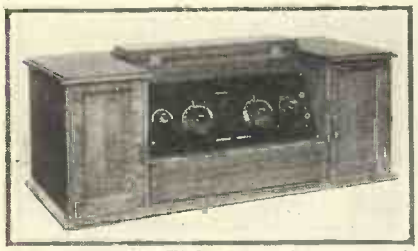
(1) It has practically unlimited range, determined principally by outside considerations, such as atmospheric conditions, local noises, etc.

(2) Remarkable selectivity is afforded so that a distant station may be received to the complete exclusion of a much nearer station, although their respective wavelengths differ only by a few metres.

(3) The amplification obtainable is so great that good loud-speaker results can be produced, without distortion, from the infinitesimal amount of electrical energy intercepted by the frame aerial.

(4) The receiving set, with frame aerial, is entirely independent of any ordinary aerial or earth connections, and therefore may be used in any room of a house or flat, or, in a modified form, it makes an ideal portable set. To the actual cost the manufacturer is obliged to add the Marconi royalty of 12s. 6d. per valve holder and a fixed amount of 30s. for patent royalty payable to the proprietors of the supersonic patent.

HART COLLINS ORTHOSONIC. ***Hart Collins, Ltd., 38a, Bessborough Street, S.W.1.***



Hart Collins Eight-valve Super-het.

This eight-valve receiving set incorporates the super-het principle in a new manner claimed to give exceedingly good selectivity and sensitivity whilst retaining the simplicity of control typical of this class of set. There are two main tuning controls, and, as a chart is supplied with each instrument, the actual operation of tuning-in any desired station within range is reduced to its simplest form, namely, the setting of the dials and switching on the valves. All batteries are housed within the cabinet, the only external accessories being the frame aerial, which is mounted on top of the receiver, and the loud-speaker. Either seven or eight valves may be used according to the volume of sound required, and, as dull-emitter valves are used, the total current consumption is comparatively small. The normal wavelength range is 250-520 metres, but by the addition of suitable coils (supplied with the set) 5XX and similar long-wave stations may be received. The well-made cabinet is supplied in mahogany as standard, but can be supplied in other woods if required. It measures, overall, 31 in. by 13 in. by 12 in.

Price (including frame aerial and coils), £50-15-0.

All-in price (ABVT and S), £70-0-0.

Ref. W.M.703.

ORTHOSONIC SPINET. ***Hart Collins, Ltd., 38a, Bessborough Street, S.W.1.***

Hart Collins Orthosonic Receiver.

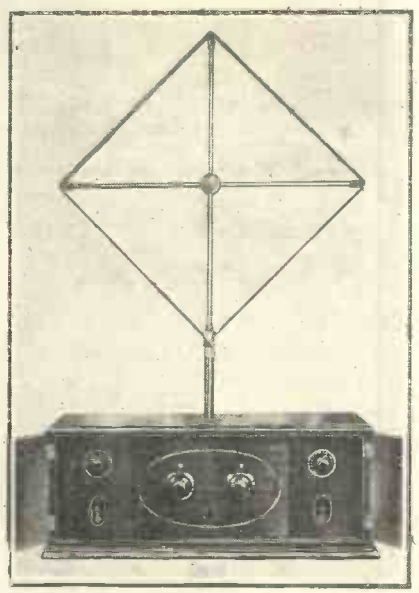
Embodying the general circuit arrangement of the eight-valve table model Orthosonic receiver, with the addition of self-contained loud-speaker (operating through a slatted aperture immediately above the control panel) and a frame aerial suspended *beneath* the set, this finely-finished Spinet type of receiver is the latest addition to the makers' range of instruments. In performance it is comparable to the previously described set, but enables the frame aerial, considered by many to be rather unsightly, to be almost concealed and does away with the necessity for a separate loud-speaker, with its attendant connecting wires.

Price (including frame aerial), £61-9-0.

All-in price (ABV), £75-0-0.

Ref. W.M.704.

ETHODYNE SEVEN - VALVE. ***Burndept Wireless, Ltd., Aldine House, Bedford Street, W.C.2.***



Ethodyne Seven-valve Super-het.

This is the type of receiver used recently with great success for broadcast reception during the run of an express train. The characteristic super-het simplicity of operation will be gathered from the illustration, which also shows the particularly neat arrangement of controls, comprising two main tuning dials, volume-control knobs, and two change-over switches. The left-hand switch changes the wavelength range from 250-550 to 1,000-2,000 metres, and the switch on the right cuts in or out the last L.F. amplifying valve. In order to obtain maximum efficiency on each wavelength range, two frame aerials are supplied with the set, the frame in use fitting and rotating in a special socket in the top of the cabinet, which makes the necessary connections to the interior of the set. In front of the frame socket is placed a small compass to assist in the directional setting of the frame. The set is designed for long-range loud-speaker reception combined with simplicity and reliability in operation and freedom from interference by unwanted stations. Judging by a preliminary test, it fulfils all these conditions most admirably and is remarkably powerful and selective.

All-in price (de luxe model), £101-4-6.

Special battery-box plinth for de luxe model only (extra), £9-0-0.

All-in price (standard model), £92-4-6.

Ref. W.M.702.

If you want further particulars of any of these sets send a postcard to US and save yourself trouble

A Split-coil Crystal Receiver

Specially designed, built and tested by the WIRELESS MAGAZINE Technical Staff

THIS month we are giving details of the construction of the simplest of all receivers, a crystal set, in which the main features are sensitivity and selectivity.

Circuit

If the circuit diagram is studied, it will be seen that the aerial circuit contains an aperiodic aerial coil coupled between the secondary coil which is split into halves, the halves being connected in parallel.

The crystal detector and phones are connected across the parallel secondary coils in the usual way.

This arrangement ensures selectivity by reason of the coupling between aerial and secondary coils, and sensitivity by reason of the parallel-coil arrangement giving a low H.F. resistance.

One Tuning Control

Only one tuning control is used, and this, together with the small knob of the semi-permanent crystal detector, appears on the front of the panel.

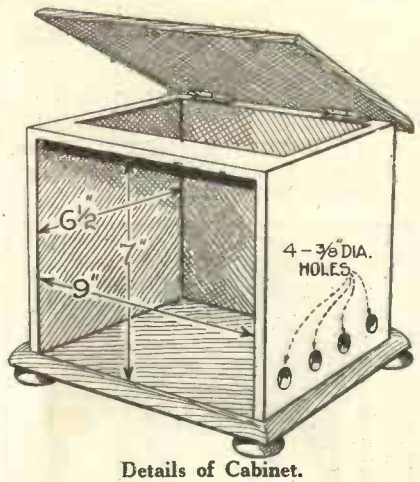
In order to cut down expense, the panel may be made of wood, but, in this case, it is advisable to bush with ebonite the two holes through which the condenser and crystal detector are mounted.

The coil unit is mounted on a small baseboard fixed to the bottom of the panel at the back, and is supported in a horizontal position by two wooden supports about 1½ in. in length, screwed into the ebonite coil former and to the baseboard.

The ebonite former is 3 in. in diameter and 4 in. long, and possesses longitudinal projections, thereby keeping the windings spaced from the former. About 15 or 20 turns of wire wound in the centre of the former constitute the aerial winding, the two ends being secured by threading them through small holes drilled in the former.

For connecting purposes an inch of wire at each end of the winding is left free. Litz wire may be used, or, to keep the cost down, No. 26-gauge d.c.c.

On each side of the aerial winding, and spaced about ¼ in. from it, the secondary coils are wound. Each half of the winding consists of 70 turns of No. 30-gauge d.c.c. wire, the ends being secured as previously described.



Details of Cabinet.

Parts Required

Other components required are as follows :—

Ebonite panel, 9 in. by 7 in. (Radion or Becol, Clayton, Peto-Scott.)

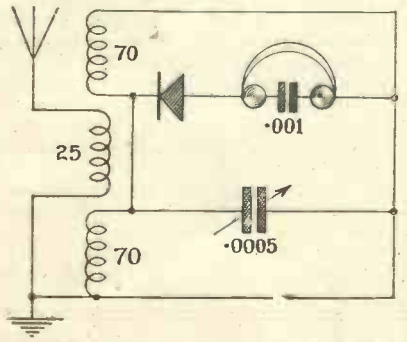
.0005-microfarad variable condenser. (Trix or Ormond, Devicon, Raymond.)

Permanent crystal detector. (Silverex or R.I., Brownie.)

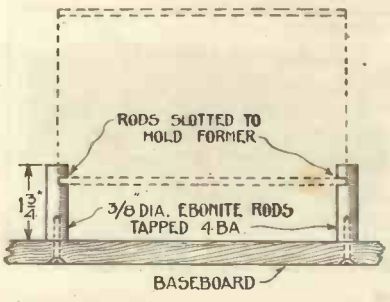
Ebonite coil former (ribbed), 3 in. dia., 4 in. long. (Radion.)

.001-microfarad fixed condenser. (Dubilier or T.C.C., Lissen.)

4 terminals. (Eastick or Belling-Lee.)



(Left). **— Circuit Diagram showing Split-coil Arrangement.** ***(Right).*** **—Details of Support for Tuning Coil.**



Ebonite terminal strip, 5 in. by $\frac{7}{8}$ in. (Radion.)
2 pieces ebonite tube, $\frac{3}{8}$ in. dia. and $\frac{3}{4}$ in. long.
2 pieces ebonite rod, $\frac{3}{8}$ in. dia. and 2 in. long.
Baseboard, 9 in. by 6 in. by $\frac{3}{8}$ in.
20 ft. Litz wire for coil.
Quantity No. 32-gauge d.c.c.
Cabinet for 12 in. by 7 in. panel. (Unica.)

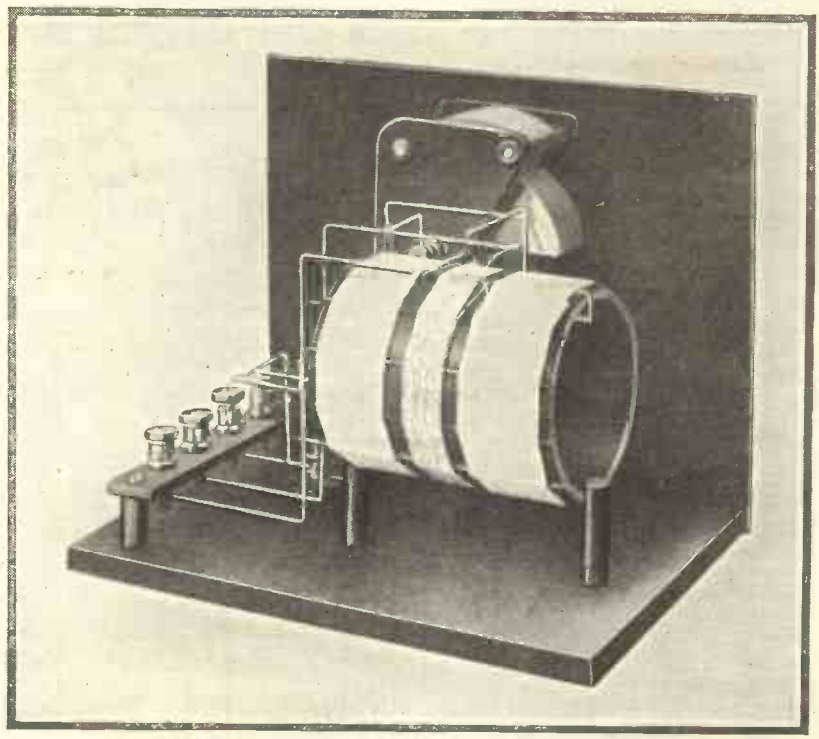
For fixing the variable condenser and the semi-permanent crystal detector, only two holes need be drilled in the panel. Both components are centrally mounted, the condenser above the crystal detector.

Six holes are drilled in the terminal strip, four terminals being mounted in the middle four holes, and the strip screwed to the left-hand edge of the baseboard by two 1in. brass wood screws passing through distance-pieces formed by two pieces of ebonite tube, $\frac{1}{2}$in. long.

Close to the two phone terminals a fixed condenser of .001-microfarad capacity is screwed to the baseboard.

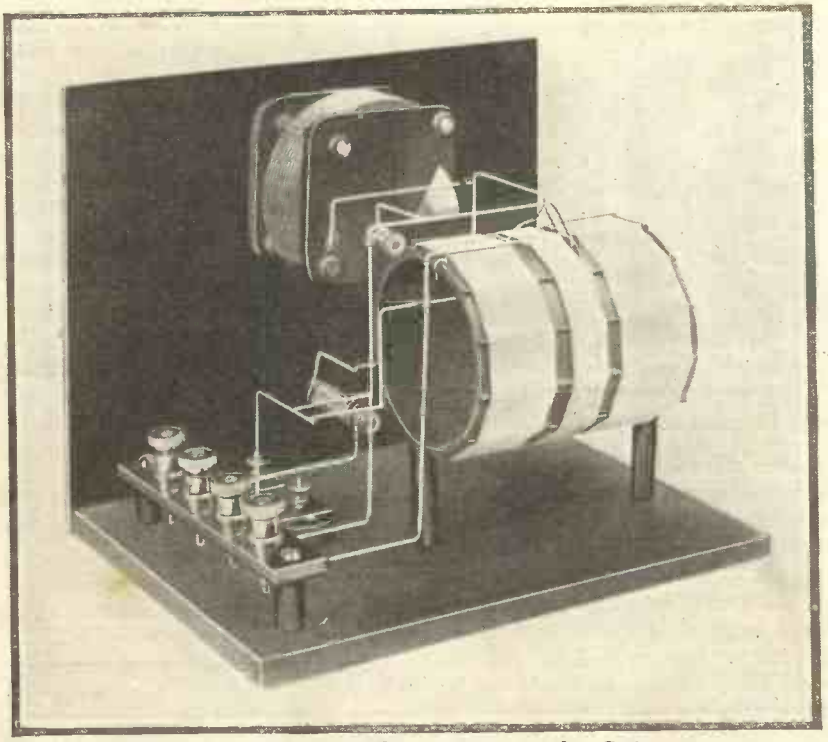
The positions of the various components may be clearly seen from the photographs and from the wiring diagram. When all the components are fixed in position, the panel and baseboard are attached to each other by three brass wood screws passing through the bottom edge of the panel.

The wiring diagram shows how the connections are made. Aerial and earth terminals are connected to



A Back-of-panel Photograph showing Wiring.

A crystal set intended for receiving two and possibly three broadcasting stations where these are comparatively close together. Unlike most crystal receivers, the selectivity is high.



A View showing the Connections to the Coils.

the ends of the central winding on the former, one terminal to each end. The inner turn of each of the outside windings are connected together and to the fixed plates of the variable condenser and to one side of the crystal detector.

The outside turns of each of the two secondary coils are also joined together, to the other side of the variable condenser, to earth, one side of the phones and to one side of the fixed condenser.

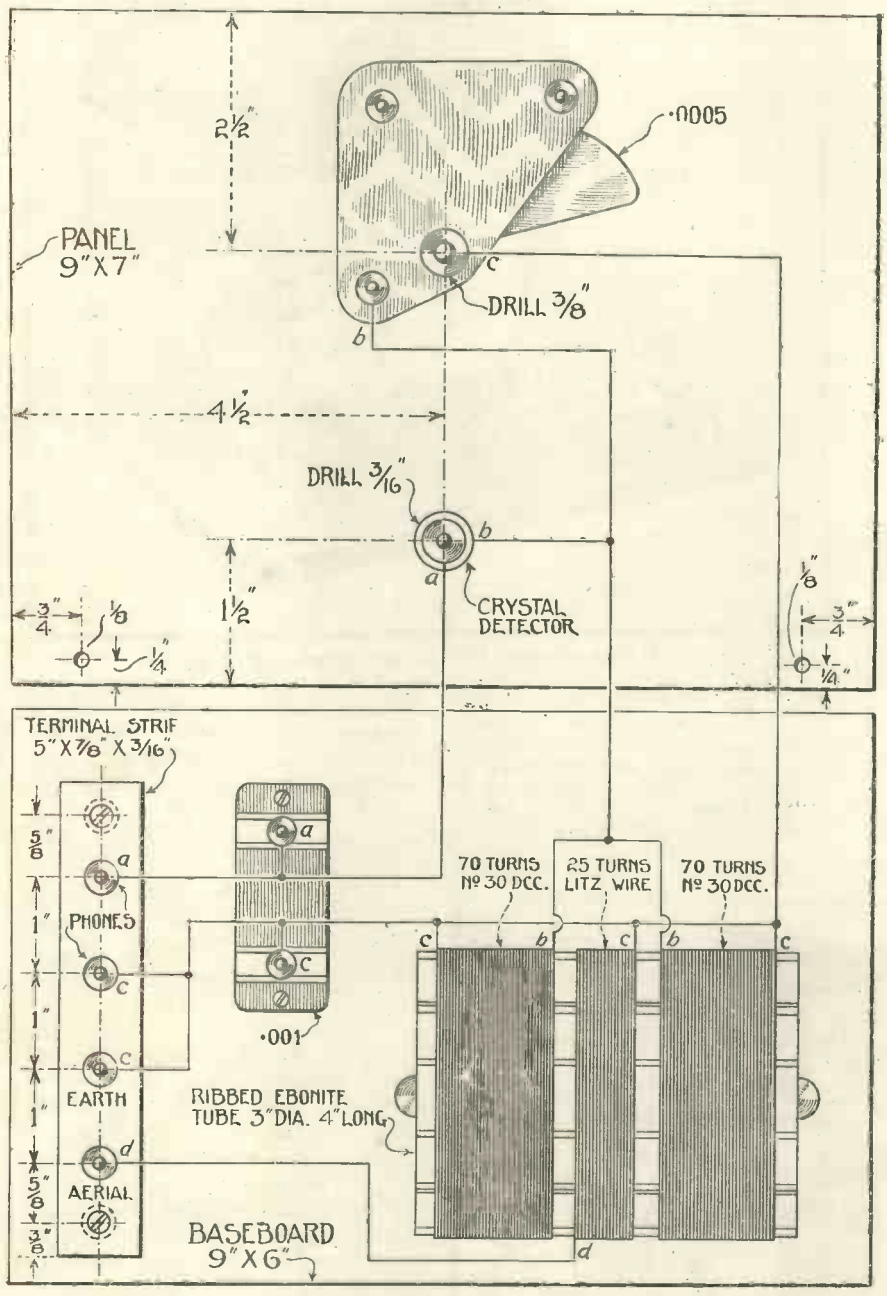
Finally, the remaining phone terminal is connected to the free terminals of the crystal detector and fixed condenser.

The set is now ready for receiving, and this is accomplished by connecting aerial and earth leads and phones to their respective terminals, and by slowly turning the variable condenser dial, at the same time adjusting the crystal detector.

When the local station has been tuned-in a final adjustment is made of the crystal detector to find the most sensitive setting, after which no further adjustment need be made, and tuning is confined to the one dial on the panel.

Connected to a good outdoor aerial-earth system two stations were received on this set—London and Birmingham, although the latter was rather faint.

A Split-coil Crystal Receiver



Combined Drilling and Wiring Diagram of Crystal Set.

There are one or two other uses besides that of the crystal receiver to which this circuit may be applied. By removing the .001-microfarad fixed condenser wired across the phone terminals and by leaving the latter unconnected the unit will function as a very efficient wave-trap of the absorption type.

If, for instance, a valve receiver is receiving a station on 300 metres and another station having a wavelength near 300 metres is causing interference, by connecting the aerial lead-in to the aerial terminal of the crystal set (now a wave-trap) and connecting the earth terminal of the latter to the aerial terminal of the valve receiver, the interference caused by the unwanted station may be eliminated by turning the variable condenser of the wave-trap until interference ceases.

This will happen when the oscillating circuit of the wave-trap is tuned to the wavelength of the interfering station. As soon as this is the case, the oscillating system of the wave-trap will begin to oscillate, but it cannot do this without absorbing energy.

The energy is, therefore, taken from the aerial circuit, and all or most of the energy received in the aerial from the transmitting station is expended in keeping the wave-trap oscillating.

The effect on the reception of the station it is desired to receive is negligible.

A crystal receiver of this type is very useful in an emergency, such as occurs when the accumulator of the broadcast receiver suddenly gives out and when some particularly interesting item is to be broadcast from the local station. Such emergencies do occur, and it is as well to be prepared for them.

Praising Wireless

Have you noticed the recent tendency to praise wireless for the good it does to the human race in a number of new and curious ways?

I have been vastly entertained by some of the benefits recently attributed to wireless. One American enthusiast says that wireless increases the production of milk, provided that the early morning programmes are suitable for the cows.

Other students of agriculture have stated most emphatically that wireless helps the ambitious cucumber or tomato to outgrow its ancestors, and that wireless makes the apples on a sensitive apple-tree swell out in pride to the size of water melons.

The only thing I have seen recorded as a mark against wireless recently is that the waves of wireless make it difficult for the pigeon and other DX birds to find their way home.

I don't know about the pigeon, but it seems to me to be a rather neat excuse on the part of the other DX birds.

H.

PROTECT YOUR LOUD-SPEAKER!

MANY listeners are not aware that in many sets two separate currents are served into the loud-speaker, one of which is essential, the other being not only unnecessary, but likely to prove harmful to the delicate windings.

This occurs when the loud-speaker terminals are connected directly to the plate and the H.T. positive terminals. This is done in many home-made sets, and in many commercially-made receivers, also.

The unwanted current is the direct current which flows from the high-tension battery through the plate circuit of the valve, so that it will incorporate and amplify the input, or rectified, current.

Number one current is unidirectional, or direct, but number two is alternating—that is, it comes in tiny pulses of high frequency. It is the delicate pulses of this second current which are needed to cause the slight variations in the magnetic field in which the diaphragm is placed, thus causing the diaphragm to vibrate and emit sound.

Saturated Magnets

In most loud-speakers the magnetic field is made permanent by the pole-pieces being already polarised by permanent magnets before the instrument is assembled. If a steady, unidirectional current, such as that which flows from the high-tension battery, is allowed to reach the windings of the loud-speaker, the finely balanced magnetism of the pole-pieces is soon disturbed, the magnets become magnetised beyond the desired amount, or "saturated," and the delicate alternating current is not able to produce the variations needed for sensitive and accurate sound vibrations in the diaphragm.

Obviously, it is wise to exclude the direct current from the loud-speaker windings. This can be done by two simple methods, known respectively as choke and transformer coupling.

Of the two, the writer prefers the first, which is the more simple. This comprises simply a choke coil and a condenser. The choke coil is connected across the output terminals of the set, and the condenser is inserted in series with the lead to one of the loud-speaker terminals.

For the choke a large inductance coil of the plug-in type may be used, or the primary or secondary of an ordinary L.F. transformer will serve excellently for the purpose. The capacity of the condenser should be determined by experiment.

This coupling acts in the following way:—The direct current, upon reaching the coil, finds in it a short path by which it may complete its circuit without flowing round the loud-speaker windings, the resistance of the coil to the direct current being very small.

On the other hand, the coil offers relatively high impedance to the high-frequency alternating current, which is consequently urged on, as it were, along the leads to the loud-speaker. But this arrangement is not entirely effective by itself, since some of the direct current will go past the coil, while some of the alternating current will leak through the inductance. The condenser is, therefore, inserted.

"*One-way Traffic*"

This operates in just the reverse manner to the coil. It offers high impedance to the direct current, and practically no impedance to the alternating current. It acts, in fact, just like a policeman directing one-way traffic. It allows only the alternating current to pass, while the direct current is barred and compelled, therefore, to flow in its entirety through the coil.

Thus the loud-speaker is adequately protected against the harmful direct current, and only the alternating, or modulated, sound-producing current is permitted to reach it.

The transformer method is equally simple and is also efficient. Here the loud-speaker is connected to the secondary of a transformer, the primary of which is connected to the output terminals of the set, and the condenser is inserted in one of the leads to the loud-speaker.

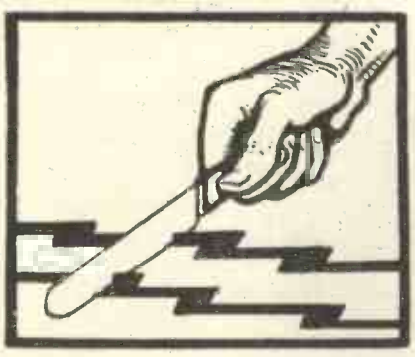
The alternating current in this case is transferred from primary to secondary, while the direct current flows through the primary, and the condenser provides an additional safeguard.

By using a suitable condenser it is possible to secure a certain amount of control over the tone of the loud-speaker. If the condenser is of a large capacity—something, say, in the neighbourhood of four micro-farads—the impedance which it will offer to all the audible frequencies will be very low, and there will be practically no difference in the tone.

But the impedance to the lower frequencies becomes proportionately higher as the capacity is reduced, so that with a condenser of about 0.05 microfarad, it is possible to exercise an appreciable control over the tone. With a condenser of this capacity the lower notes are reduced in intensity, and the higher notes seem correspondingly pronounced.

If, therefore, you have a loud-speaker which seems unduly low in tone, it will be worth while to try this simple method of raising the tone.

When either of the above methods of protecting the loud-speaker windings is used, it does not matter which way round the leads are connected to the terminals, whether positive to positive, or *vice versa*. L. B. P.



"CUTTING THE CRACKLE"

HOME-BUILT receivers sometimes develop a tendency to crackle, sizzle, whistle or even howl at the least provocation and generally at most inopportune moments.

Such noises, besides being extremely vexing, are for the most part quite unnecessary and easy to avoid, but once established prove difficult to trace and cure, while not infrequently they lead to a complete overhaul with possible reconstruction before the source of the annoyance has been discovered.

Possible Causes and Cures

It is the object of these notes to outline the causes of certain undesirable noises to which a receiver may be subject, and at the same time to indicate a possible cure.

It will be apparent that a crackle or howl may be attributable to many things, and therefore it is almost without the bounds of human possibility to deliberately assert that an extraneous noise which has developed in a loud-speaker during reception is due to one fault alone.

Admitted that it may be so, but on the other hand, it may be the product of several small defects and as hard to detect as the originator of a family cold.

First, then, in order to eliminate as far as possible the likelihood of a cumulative crackle occurring in a receiver well under a year in age, the constructor must employ reliable ebonite, valve holders and components, and he must be able to admit to himself that the wiring is spaced and soldered or joined in a manner beyond reproach.

After Prolonged Use

In other words the constructor who expresses himself satisfied with his handiwork should not experience trouble in this direction until the receiver and its equipment have been in use for a considerable period.

Age will always talk about itself, and therefore on the first sign of a crackle suspect the valves and batteries; yet although these faithful friends are always the first to be blamed it is not uncommon to eventually find that the annoyance exists through:

(1) Atmospherics.
(2) Electric mains, tramcars, etc.
(3) Faulty connection at a soldered joint or a loose terminal nut.
(4) A film of long-forgotten soldering flux to which has been attracted metallic dust.
(5) Faulty ebonite, cracked and dust ridden, thus providing an insulation leakage.
(6) Intermittent leakage at valve holders caused by dust or faulty holders.
(7) Poor contact established at switch heads caused by long and neglected wear, loose connections and the gradual collection of metallic dust.
(8) Faulty valves and valve legs produced by constant removal.
(9) A burnt-out transformer or choke winding.
(10) Badly-fitting or loosely-connected coils.
(11) Movable condenser plates bent and covered with a film of dust.
(12) A faulty grid leak.
(13) Bad contact on rheostats or potentiometers.
(14) Bad insulation in telephones or loud-speaker.
(15) A faulty flexible lead to telephones or loud-speaker.
(16) An old high-tension battery offering a high and fluctuating resistance.
(17) A low-tension battery with an internal short-circuit and fluctuating voltage.

Thus we have seventeen probable causes, one or several of which may apply to any receiving circuit, while each item is of sufficient importance to contribute to the detriment of the reception.

It is for the experimenter alone to satisfy himself where the actual source exists, but we can aid his investigations materially if we proceed to demonstrate how several of these items can be tested without much trouble or delay.

For instance, the opening of the aerial switch while transmission is in progress will prove conclusively whether atmospherics are producing the interference or not.

Transformer Short-circuit

A short-circuit in the windings of a transformer, a break in the windings or an insulation leakage in a transformer or choke coil may be detected by the use of a pair of phones and a dry cell connected in series.

If this testing unit is connected in series with the primary of the suspected transformer after all the receiver leads have been disconnected from it, a loud click should be heard on making the circuit and complete silence when contact is broken if the winding is intact. The same result should occur when testing the secondary, but in this case if all is well the click will be quieter.

If, however, the primary has broken down, and it is more prone to damage than the secondary by reason of the heavy anode current it is called upon to carry, then a faint click will be heard at both make and break, and if the secondary is tested a scarcely audible sound will result.

Bad Insulation

Even if the windings are perfect, insulation may be the cause of the crackles. This can be tested in a similar manner, but on making the primary circuit after the normal loud click is heard, there will be a rustling, scraping sound instead of the complete silence.

The only sure remedy for a faulty transformer it to substitute a new one, but it is sometimes possible to temporarily effect an improvement in insulation by placing the suspected transformer in a heated oven for at least 12 hours. This cure can be relied upon only if the breakdown is slight.

Chokes and other iron-core com

ponents may be tested in a similar manner to the above.

A slight movement with the hand of all inductance coils, valves and common vanes will quickly prove whether they are making imperfect contact. This operation must be performed while the receiver is working.

A bending of the connecting flex between the receiver and the loud-speaker or telephones along the whole of its length should effectually establish whether a break or internal fray exists.

Periodic Inspection

The surest way to avoid the possibility of crackles is to carry out a periodic inspection of all joints and components, especially batteries ; but in the first place, if a finished receiver is not freed from flux and dust and built from the very best ebonite and ebonite fittings, then sooner or later the objectional crackle is bound to be heard.

There is another type of crackle which is attributable to the use of graphite resistances in the anode circuits of resistance amplifiers. Here again time and age and excessive usage help in the undoing of a good component by disintegrating the graphite used in the composition of the resistance.

With this system of amplification it is never wise to employ resistances of the graphite type, but rather to use wire-wound non-inductive resistances.

Let us turn from the crackle to the sizzling or buzzing noise sometimes heard in the loud-speaker. Experimenters are often puzzled by this occurrence, which is very difficult to eliminate unless the exact cause is known and the receiver accessible for modifications.

This buzzing is attributable to the L.F. valve or valves bursting into oscillation at an audible frequency, and may be produced by three factors ; firstly, bad spacing of the low-frequency components, secondly, interaction between the wiring on the L.F. side, and thirdly, to heavy fluctuations in the anode-current supply from the high-tension battery.

To correct this interference the transformers or chokes, etc., should be situated in opposing planes and shielded or earthed if necessary ; the wiring should be as far apart as possible, clear of the ebonite and surrounding components.

Each valve should be supplied with a separate high-tension tapping, the necessary pressure being most carefully selected while the battery should supply a constant and reliable current.

High-resistance valve-safeguarding devices should be avoided, otherwise a fluctuating voltage drop will be brought about which will defeat the care exercised in other directions and so fail to abolish the oscillating buzz.

Resonant howling and microphonic valves are other causes of defective reception. A loud-speaker roar which develops in strength may often be reduced, if not abolished, by keeping the " speaker " at some distance from the receiver and by employing antiphonic valve holders, whilst an additional precaution is to encase each valve in a shroud composed of insulating tape and by connecting the valve tips together by the same means.

Dull-emitters

Dull-emitter valves are frequently prone to this trouble, which is aggravated if the receiver happens to be extremely sensitive with a large amount of self-capacity.

Another type of noise in an entirely different class is distortion when regeneration is absent, and proves, as often as not, the most difficult of all " quality faults " to detect.

This kind of distortion may take the form of detector-valve distortion or wholesale receiver distortion. The former is generally due to a too large amount of leakage, and may be cured by lowering the value of the grid leak ; this, in its turn, may lower the signal strength, but the improvement in quality usually establishes a satisfactory balance.

To adequately overcome such distortion a system of variable grid condensers and leaks is advisable with allowance for anode rectification in the case of distant signals.

Wholesale distortion without regeneration may be due to a faulty valve holder, ebonite, dust, flux and so on, or may be due to a bad combination of valves without regard to correct biassing, the cure being effected by a scrupulous internal inspection.

W. D. KENDRICK.

IN FAR-OFF SHANGHAI !

Up-to-date Receiver in the East : note the Brown loud-speaker.

What the B.B.C. Is Doing

THE intentions respecting programme arrangements of the British Broadcasting Corporation, a body which, it should be observed, does not yet exist, are already being canvassed in some sections of the lay Press.

Listeners are counselled to ignore any speculative outside reports as to the future intentions which they may read in the meantime, whether they refer to the alleged closing of certain broadcasting stations, the rejection of controversial matter, or the extension of talk features. It becomes obvious, on reflection, that the Corporation, not yet being formed, cannot function.

While the prospective members of the new body may be impressed by the work accomplished by us, they may as likely as not decide, when they get into harness, that in view of the widespread influence of broadcasting, and in spite of the eulogistic references to our work in the past, our organisation does not correspond to the national needs and, as trustees for the national interest in broadcasting, they must exercise a freedom and flexibility which in several directions and for various reasons, the Company was precluded from manifesting.

Alternative Programmes

One direction in which this flexibility is expected to be shown is in the provision of facilities for alternative programmes of a distinctly educational type. This move would not necessitate the entire abolition of the informative element from general programmes intended for listeners in the mass; indeed, vociferous as the outcry has been at different times against talk features in the programmes, there exists, as our investigations have proved, a strong body of opinion in favour of the maintenance and extension of such features; but the alternative would enable special transmissions of longer lectures to be provided on topics which would appeal to those of more educated habit, together with the higher forms of music and drama.

This development, enabling nearly every listener in the British Isles to have the choice of at least two programmes available simultaneously on cheap and simple apparatus, with the initial step of erecting a number of new stations of higher power than any of the existing main stations, would definitely entail the provision of more money at the outset. In addition, increased expenditure on the programme side would be a constant factor.

2¼ *Million Listeners*

While the B.B.C. was originally constituted on trade lines, it has not been a trading concern in the ordinary meaning of the term. Apart from the dividend of 7½ per cent. on the initial capital of £60,000 to the wireless manufacturers who put up the money for the service in 1922 and took the risk of success, or failure, all the revenue that accrues to us is spent on the service.

Great Britain has now about 2¼ million licensed listeners, and although it is common knowledge that the licence fee of 10s. is divided between the Post Office and the B.B.C. in the proportion of 2s. 6d. and 7s. 6d. respectively, it is not even now generally realised that nothing like an income of some £850,000 reaches us.

Under its original licence from the Post Office, the Company was entitled to 75 per cent. of the total licence collections; but under the supplementary agreement relating to the period January 1, 1925, to December 31, 1926, it was laid down that the B.B.C. should receive "such proportion as the Postmaster-General in consultation with the Company should consider reasonably adequate to enable the Company to provide a broadcasting service to his reasonable satisfaction."

The Postmaster-General took the decision to limit the Company's income to £500,000 for the year ended March 31 last, for three reasons: those are, (1) on the basis of the figures then before him, (2) because of the absence of public representation on the Board of the Company, and (3) in view of the broadcasting inquiry under Lord Crawford's chairmanship which was at the time contemplated.

But anticipations do not always merge into realisations. The Post Office only secured during the last financial year for current expediture a sum of £50,000. Hence in the struggle to create, organise and transmit material for about 5,000 hours of programme time per month our work, during our declining days, is crippled to an extent that the public at large scarcely comprehends.

The amount available for outside broadcasts alone is barely sufficient to pay the salaries of two engineers until the end of the year, let alone to meet the Post Office bill for land-lines, and for incidental expenses.

A Wrong Policy

This is altogether wrong. Broadcasting must develop or perish. The future financial requirements of the service cannot be stabilised on the basis of past accounts; for broadcasting is still in its early stages and holds promise of greater possibilities than anything yet accomplished. Apart from the need for improved quality and variety of programmes, only the fringe of the problems of research and equipment have been touched.

If we were permitted to continue our work unimpaired, we might inscribe in imperishable letters over our portals in Savoy Hill a paraphrase of a very famous dictum: "We can please some of the people all the time; we can please all the people some of the time; but we cannot please all the people all the time." For this is the situation as regards our programmes, which are

compiled, not with the view of pleasing our officials, or yet of appealing to a limited number of so-called highbrows outside; but to satisfy as many listeners as possible all the time.

So far as the programme features are concerned, the contents of Savoy Hill's postbag, analysed in conjunction with the reports of our own critics, generally furnish a fairly reliable idea of the public's attitude towards particular items that are broadcast; but a listener will frequently pick on something that offends his own susceptibilities, something that does not appeal to him as an individual, and will hold forth on the iniquities of the broadcasting authorities in daring to transmit such arrant rubbish.

Sometimes the trend of the criticism almost makes the officials despair; and then comes the little gleam of sunlight that tells them to take heart of grace because of that other camp of followers blest with a broader and saner outlook on the difficulties that beset attempts to present programmes of general interest.

We rejoice in the view of the Manchester listener who says that there is some high-class music which he does not appreciate and some that he does; that some jazz music is to him "devilish" stuff, while some is happy, bright and helpful; humour that is good and some that is poor; talks and the like that are welcome and some that are nauseating—to him.

But, he asks, has he the right to demand that the whole of the programme shall be made to his liking, and that the other man shall not have something that he likes? Would it not be selfish of each to expect all that he wanted, in opposition to the expressed wishes of the other?

This is the right view, and the view that is of moral assistance to us in our difficult task. Neither the Company, nor any successor to the present organisation, can give to an audience so vast and varied everything that it wants, day in, day out. Always, even with two programmes, the possibility of only partial success in catering for that great unseen audience will be encountered, and while we constantly invite constructive criticism, we do appeal to listeners to view the programmes in the light of unselfishness and in a spirit of consideration.

SPOTTING THE STATIONS

By an Ordinary Listener-in.

I AM not an electrical or a mechanical engineer, but I can spot most of the B.B.C. stations, and know exactly which station I have spotted without hearing the name or designation of the station announced.

At present the indicator of my set is turned away from all the stations, and my friend is regulating the receiver, to which my back is turned. I do not know what is the programme of any station.

My friend, who does not know the position of the stations on my set, is tuning-in. "Which station is that?" he asks; and without any hesitation I answer, "Bournemouth." I know the orchestra, the cornet player in particular, and the announcer's voice. Besides, there's a different buzz coming from Bournemouth to any other station I know. The sensitive ear cannot fail to spot the buzz once it knows of it.

"What's that?" asks my friend after turning the indicator again. As soon as we are tuned-in properly I have no hesitation in believing it to be Cardiff, and say so. "Correct," he replies. The announcer has not spoken, the orchestra has not played, but the sound comes through my set in waves. It always does from Cardiff. The sound ebbs and flows, it gets louder and then faints away. And if I wanted any further evidence this evening, a lady soprano is singing a Welsh song.

"Try another, friend," I ask. He turns again and tunes-in, "That's London." "Why?" he asks. "Because no other station comes to me as clear as that. That's the best I can get out of my set, and I know that to be London. There is no buzz, no ebbing and flowing of the sound. It's a perfect reception." After consulting the programme and thinking I was had this time, my friend found that the station was London.

We try again, and the next station we get is Manchester. There's an empty feeling about this station, as the sound comes through to me. The studio sounds like a huge hall with a slight echo in it.

And so we go on.

Birmingham is faint, fainter than any other station.

Hoarseness is the characteristic of Stoke. The station seems to be suffering from a throat trouble, something like laryngitis.

Thud—thud—thud—thud, comes from Plymouth every minute or so. Some days the thud comes every fifty seconds, on other days every eighty seconds. In rainy weather the thud recurs every 100 seconds. It is not annoying, but it makes you conscious that it is there all the time.

Newcastle and Edinburgh I cannot distinguish. I know they must be one or the other, because neither has the characteristics of any other station.

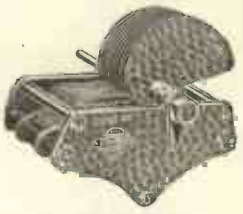
Liverpool is like a gramophone—the nearest approach to the gramophone of all the stations.

Glasgow is a cross between Cardiff and Plymouth. It has the ebb and flow, and also the thud on a smaller scale than Plymouth.

Catarrh is the weakness of Aberdeen. This station is hoarse and has a slight buzz not so definite as Bournemouth, but yet marked.

So far, the other stations have no distinguishing sounds to me, but I think it will be possible for me to spot these as well as the others.

E. E. R.



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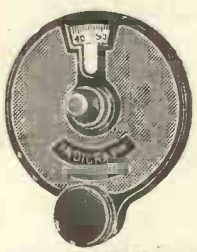
IGRANIC TAPPED H.F. TRANSFORMER.

RADIO IGRANIC DEVICES

IGRANIC CENTRE-TAPPED "XLLOS" COIL.



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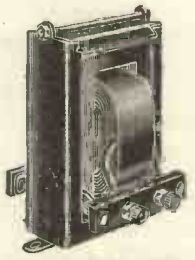

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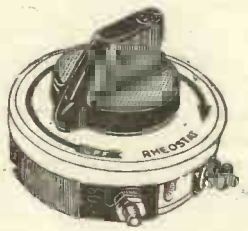

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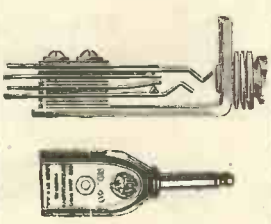

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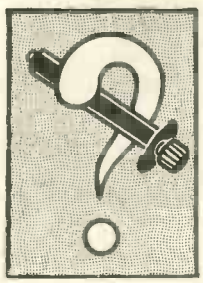
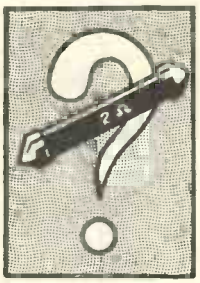


WHERE SHALL I CONNECT THE GRID LEAK?



AN observant person looking through a number of circuit diagrams cannot have failed to notice that the grid leak is connected to a number of different places in different diagrams. In some the leak is across the condenser, in others it is connected from grid to L.T. —, in others to L.T. +, and so on.

What is the effect of these different connections? It is all a question of putting a correct bias on the grid of the valve so that it will function best for whatever purpose it is used.

Let us first of all clear up the fact that it is quite immaterial, except in the case of tuned-anode circuits, whether the leak is connected across the condenser or from the grid direct to some part of the filament circuit. That is quite a matter of personal preference.

In tuned-anode circuits, including the detector valve which follows them, it is clear that the leak cannot be connected across the condenser because the H.T. positive would be connected straight to the grid of the valve. In all other cases it does not matter in the slightest.

As a general rule it may be stated that when one wants to use a valve as an amplifier it is necessary to bias the grid negatively; when wanting a valve for cumulative grid rectification (that is, rectification by the grid-condenser-and-leak method) one must bias the grid positively.

By biassing a grid positively or negatively is meant making the grid more positive or more negative than the negative end of the filament of any particular valve. Fortunately, for rectification, the manufacturers so design their valves that putting the correct positive bias on the grid is made a very simple and direct matter.

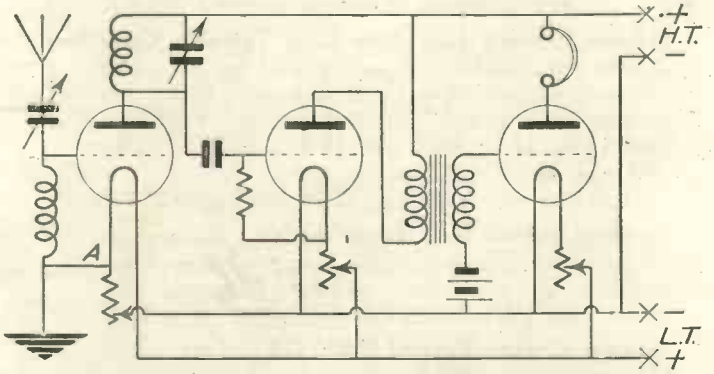


Fig. 4.—Typical Three-valve Circuit Showing Proper Grid Connections.

Valve manufacturers so arrange matters that the detector-valve grid is correctly biassed when that electrode has impressed on it a positive voltage equal to the normal filament voltage of the valve.

To quote examples, a DE3 valve operates best as a detector when its grid is made about 3 volts more positive than the negative end of the filament. Again, an R5V valve is most efficient as a rectifier when its grid is biassed to the extent of approximately 6 volts positive. The convenience of this design is obvious, since it is only necessary to connect the grid return lead to the positive side of the filament.

It must here be noted that it is important to what part of the filament circuit this connection is made. There are cases where it must not be taken to the L.T. + terminal of the set, since a battery of 6 volts might be employed to operate DE3 valves through a 50-ohm rheostat or fixed resistor, and it is clear that 6 volts bias would be too much.

The question therefore arises—where to connect the leak for best results in different circuits and with different L.T. voltages?

The example shown in Fig. 1 is a case in point. Here the leak is connected to L.T. + via the A.T.I. and rheostat winding. Why not connect it directly to L.T. +? Because if a two-volt valve were being operated from a four-volt accumulator through a high resist-

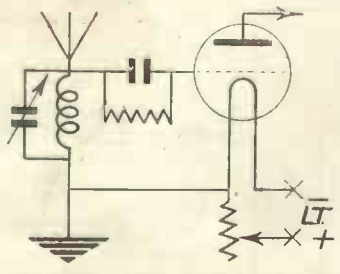


Fig. 1.—Grid Leak Connected to L.T.+ via the A.T.I.

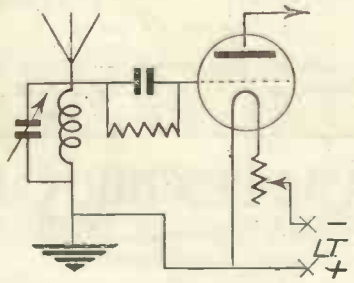


Fig. 2.—Rheostat in L.T.— Lead.

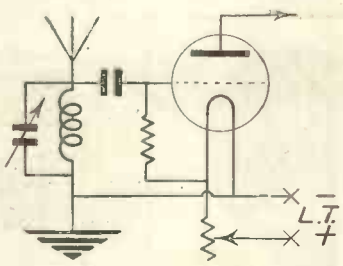


Fig. 3.—Grid Connected Directly to Filament.

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An excellent all-round-purpose Valve. Very effective as an L.F. amplifier, especially in last stage. Exceptionally good as a rectifier and very efficient as an H.F. amplifier.
Fil. Volts: 1·6-1·8.
Amps.: 0·3.

PRICE 14/-

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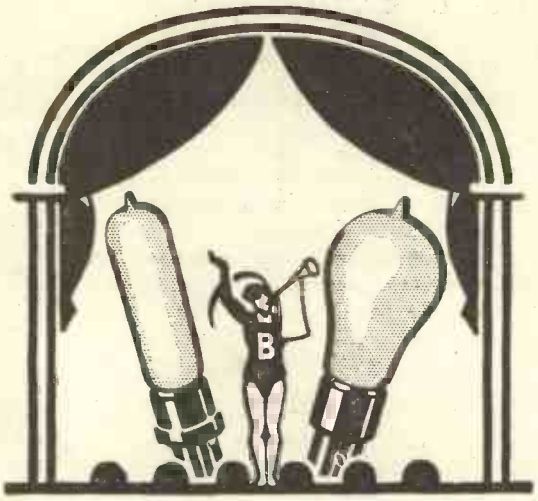

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Where Shall I Connect the Grid Leak? *(continued)*

ance rheostat, due to the drop in voltage across that winding, the grid would be at four volts positive with respect to the negative end of the filament, while the positive end of the filament would be at two volts only.

Rheostat Connections

By inserting the rheostat winding in the negative L.T. lead the grid return lead may be connected direct to L.T. + as in Fig. 2. Here also the drop in volts across the rheostat has no effect whatever on the grid bias. It is, however, necessary to connect L.T. + to earth, as shown. For rectifying valves this does not matter—it being quite immaterial whether L.T. — or L.T. + is earthed.

In Figs. 1 and 2 the leak is shown connected across the condenser. In Fig. 3 is shown a circuit identical with Fig. 1, except that the leak is connected straight from the grid to the positive side of the filament. This would be suitable for a detector valve following a tuned anode H.F. amplifier.

With reference now to Fig. 4, there is shown a diagram for a straight-circuit receiver in which the first valve is a tuned anode, the second a detector, and the third a transformer coupled L.F. amplifier.

In the case of the first valve the grid-return lead (A) is connected directly to the filament, since the grid of this valve must be as much negative as is the negative end of the filament. As this is a tuned-anode receiver the leak of the detector valve is not placed across the filament for reasons which have been stated, but is connected from the grid to the filament end of the rheostat winding.

Grid at Equal Potential

By doing this the grid is kept at a normal potential equal to the positive end of the filament.

In the case of the L.F. valve the grid-return lead is connected to L.T. — and a grid-bias battery is inserted whose negative faces the grid of the valve and whose positive goes to L.T. —.

In quite an ordinary normal 3-valve circuit, therefore, we have each grid differently biassed. On the H.F. valve there is a negative bias equal to the potential at the negative end of the filament, on the rectifier there is a positive bias equal to that of the positive end of the filment, and on the L.F. valve is placed a much greater negative bias by means of a special battery.

The bias on the first two valves is obtained entirely by the correct connection of the grid return lead; it will therefore be seen that that connection is of great importance to the successful operation of a receiver.

R. B. H.

IN WESTERN CANADA

PERHAPS nowhere in the world is wireless more appreciated than in Western Canada. On lonely homesteads, where men have been known to go melancholy mad for want of society, it is now possible to hear the voice of a fellow man every day.

Each day at noon grain prices, weather reports, etc., are broadcast; these are of immense value to the farmers both near and far. During the long winter months concerts are broadcast each evening, except Tuesday, and lectures also quite often.

In this way the farmer and his family are able to listen to good music, which many of them have not had the opportunity of hearing for years. Lectures are given by experts in various branches of agriculture, which must be exceedingly helpful to the farmers; there are, as well, occasional lectures on other subjects.

Tuesday is "silent night," to enable folks to pick up long-distance stations, which some of them cannot do when the Edmonton *Journal* station is broadcasting.

Many of the well-to-do farmers, storekeepers and others have quite expensive sets. With these they are able to get the big cities in the United States and listen to some of the finest musicians and singers in the world. On more than one occasion music broadcast from England has been picked up in Alberta. Dances are held in the country districts for which the music is supplied by wireless from some big city.

Men at the fur-trading and police posts in the far north, right up to the Arctic Circle, have found broadcasts a great boon. It enables them to keep in touch with the outside world, from which they are separated in person for years at a time.

Specialist's Advice Broadcast

Last winter there was a woman seriously ill in a little village some two hundred miles north of Edmonton. Her husband wrote to a specialist in the city for advice, and the latter, knowing that the case was urgent, went to the Edmonton *Journal* office and was allowed to speak over the microphone suggesting remedies for the woman. The message was picked up by a neighbour and conveyed to the husband; it undoubtedly saved the woman's life.

Some time ago a prisoner escaped, but with the help of wireless he was soon recaptured. His description was broadcast all over the country as soon as he was missed. A farmer notified the police he had seen him and he was quickly apprehended.

There are two big broadcasting stations in Alberta. One is at the *Journal* office in Edmonton, referred to above, and the other at Calgary, at the office of another newspaper. There are, in addition, a number of Government wireless stations in the province, particularly at the police posts in the north.

S. J. W.

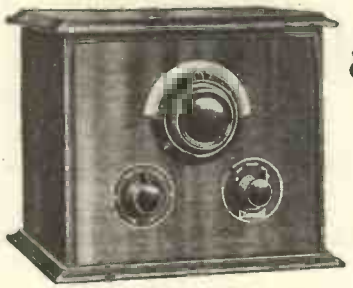
A Grand Tour

A hundred years ago it was only the sons of the rich who were sent on the Grand Tour to enlarge their minds and interests. Nowadays grand tours round Europe are accessible to the poorest person with a set and a pair of phones.

These half-hour "trips," it might be imagined, would appeal only to the educated highbrows; but I believe actually they mean much more to folks who are never likely to go abroad in the flesh. To such stay-at-homes they seem to have an extraordinary realness and interest.

BURNDEPT

and the New Season



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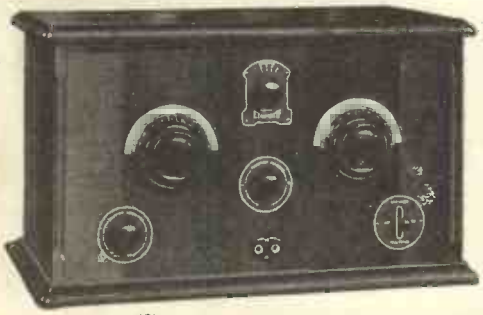

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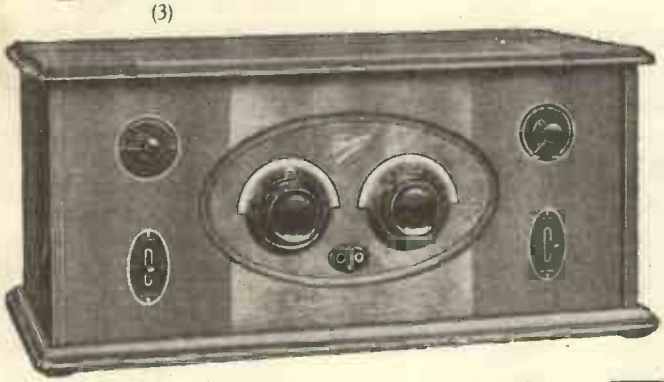

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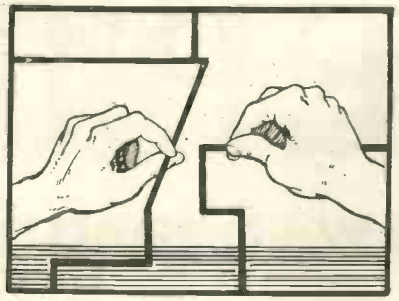

HOW TO SPACE YOUR WIRING

By H. M. LOWE, M.Sc. (Vict.).

THE builder of wireless sets is frequently told of the necessity of spacing his wiring, and of the importance of following exactly the design given. Let us inquire briefly into the reasons for spacing, and how these reasons are to be applied in practice.

Magnetic Fields

Any wire through which an electric current is flowing possesses what is known as a magnetic field around it, that is, a space in which it is capable of influencing a magnetized piece of metal, such as a compass needle. The strength of the field and its size depends on the current flowing through the wire.

Now this field, while it is capable of deflecting a compass needle from its usual position of pointing north and south, does not possess any qualities which will affect our wireless set so long as the current (and therefore the field) is steady. But as soon as the current begins to vary, to increase or decrease or to alternate in direction, the field becomes possessed of properties strikingly different. For example, the compass needle, previously steady in a definite direction, will now vibrate to and fro (unless the reversal of direction is so rapid that the needle cannot for mechanical reasons follow quickly enough), and in vibrating it can be made to do a certain amount of work. In other words the space round the wire is now in such a condition that work can be obtained from it without contact.

"Picking-up" Fields

In point of fact, that is the whole essence of wireless. The aerial of the sending station has generated in it currents which reverse their direction a million times per second and the field round these is enormous, so that 20 miles or so away from the aerial a steel plate (the diaphragm of a telephone) can be made to vibrate in sympathy. It is not *quite* as easy as that; you cannot vibrate the diaphragms directly, but you only need an aerial and a tuning device to "pick up" the very slight and weak field.

But to return to our wireless set. We have already seen that it is those wires which carry an alternating current that can do work without contact, and also that the more rapid the alternations, the further the field will extend.

No matter how good the circuit and what high-quality components are used, no receiver will give of the very best results unless due attention is given to the spacing and position of the wiring.

Every home-constructor should read this article carefully so that he understands clearly how wiring should be carried out and why it should be done in a particular sequence

Besides doing work by moving a compass needle to and fro, the magnetic field is capable of producing work by producing an electric current in neighbouring wires, or in neighbouring conductors of any kind. Hence, if the alternating current is flowing in your aerial, bringing your hand near the aerial (without touching it) will cause small currents to circulate through your hand and body, leading part of the aerial current away and weakening your signal strength. This effect is best shown on an aerial close to the oscillation point, or actually oscillating, but, keen novices with reaction on the aerial, please don't repeat it too often; it interferes with the neighbours. Incidentally, it will teach you that you have too much reaction already for safety.

D.C. Conductors

We must, however, come down to practice. The wires in which only direct current is passing can in general be placed anywhere, but as they are unaffected by bringing the hand near to them, they are best placed closest under the panel. Here they will always be between the hand and the light-frequency wires which will be further behind, and will partially form a screen to shield the high-frequency wires from hand-capacity effects.

The wires to be placed directly under the panel are those conveying the direct current from the accumulator to the rheostats, the filaments of the valves, the earth terminal, and the direct connections from these to the earthed side of the aerial tuning condenser, and the earthed side of the aerial tuning inductance. These are all at a steady and unvarying potential, that is, earth potential or 2-, 4-, or 6-volts below or above earth potential.

Steady Potential

Other wires which may safely be put close to the panel are those from the high-tension positive to transformers, chokes, resistances, tuned anode condenser and inductance. All these, again, are at a steady potential and not at an alternating one. The arrangement of these wires under the panel so that they come between the hand and those wires about to be described is often of great importance in minimizing the effects of hand capacity.

It is because the spindle of the variable condensers (attached to the moving plates) comes right through

MORE FACTS ABOUT AUDIO FREQUENCY TRANSFORMERS

The simplified expression giving the amplification ratio of valve and L.F. transformer is :—

$$\mu \times \sqrt{\frac{Z^2}{R^2 + Z^2}}$$

where μ is the amplification factor of the valve.

"Z" is the impedance of the transformer.

"R" is the impedance of the valve.

If, at a given frequency, the valve impedance "R" equals the transformer impedance "Z," the expression becomes $\mu \times \sqrt{\frac{1}{2}}$ or $\mu \times 0.7$.

On the other hand, the greater the transformer impedance "Z" the more nearly does the expression become equal to $\mu \times \sqrt{1}$ or $\mu \times 1$.

Thus, the greater the transformer impedance the greater the amplification ratio, and to choose a transformer of lower impedance to match the impedance of the valve merely results in impairing the amplification.

Therefore, to obtain the best results choose a transformer of very high impedance, and, seeing that transformer impedance varies with frequency whilst valve impedance is practically unaffected by frequency, choose a transformer which has high impedance at low frequency, say 100; otherwise, low notes will not be reproduced satisfactorily.

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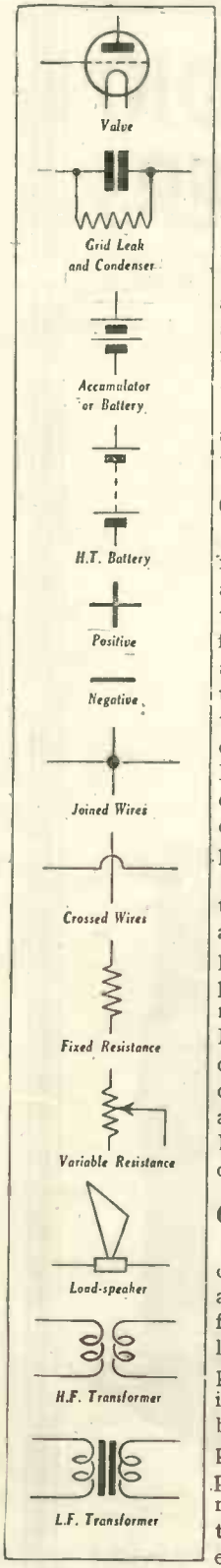


the panel to the fingers, that these moving plates must be attached to earth or H.T. + and not to aerial or anode.

Now the aerial terminal is at a varying potential sometimes above the earth, sometimes below it, alternating a million times per second. This varying potential is communicated to the grid of the first valve (perhaps through a grid condenser and leak); magnified by the valve and transmitted to the anode, and from this to the grid of the next valve. All these wires are "danger" wires. Keep them well away from the panel, and to minimize their effect keep them short.

Grid Lead

From the aerial terminal to the first grid need seldom be more than a couple of inches in length, and at the top of a panel the lead is away from the hand. Don't bring it right across your panel from an aerial terminal on the right to a valve on the left, close under your hand, and expect your set to be easy to control. From the aerial to the tuning condenser and inductance the wire is a danger wire to be kept away from the panel and as short as possible.

From the anode of the valve to the tuning condenser and inductance, and to the next grid, as short as possible, please, and back from the panel. Also from the anode to the reaction coil is another danger wire. From reaction coil to transformers or phones is usually safe, as most of the high-frequency pulsations are absorbed by the reaction coil. It is safer, however, to treat it as a danger wire.

Grid Leaks

As to the grid leak a special word of warning is necessary. If there is a detector valve without high-frequency amplification, the grid leak, if of a fixed type, is usually put across the grid condenser. But if it is variable, and so placed, both ends will be at a high-frequency potential, and when the hand is placed near, loss of signal strength results. A variable grid leak should therefore be attached with its handle end attached to the L.T. + wire, that is the earth, and its far end to the grid. This arrangement will enable the leak to be fingered with immunity from hand-capacity effects.

From what has already been said, it will be seen that the low-frequency side of the set is less liable to cause trouble. But even there, the same rules can be applied. From the anode to the transformer, and from transformer to grid, are danger wires, but from the H.T. + and G.B.— to the transformer are safe wires.

Always attempt to keep a network of "safe" wires between the danger wires and the hand.

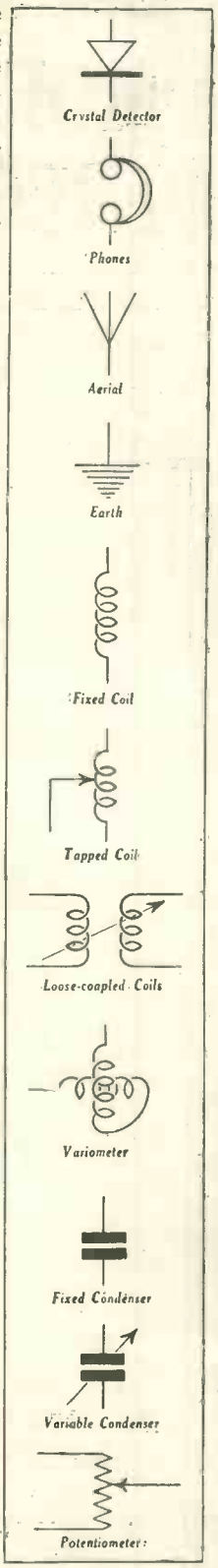
Danger Wires

Having followed these rules, the keeping of the danger wires from each other follows easily and almost automatically, for there are sufficiently few of them to space themselves easily if they are kept reasonably short.

One other point requires mention, concerning the layout of the front of the panel. Tuning coils and reaction coils have always large high-frequency currents passing in them, and should therefore be disposed so as to be out of the way of the hand when this is put to tuning condensers, rheostats, grid leak or any other adjustable accessory.

Tuning condensers should, therefore, be near the bottom of the panel and coil holders at the top with the valves.

If these simple rules are remembered and a little trouble taken in putting them into practice, that frequent source of involuntary oscillation, the set that howls whenever you approach it, will become a thing of the past and a nightmare forgotten in the bliss of a silent ether.



SHELLAC VARNISH

Although, owing to the introduction of low-loss ideas, shellac varnish is not so much used nowadays as was the case a few years ago, it is still found very useful for some purposes. However, when this varnish is required in wireless work the amateur should always buy flake shellac and mix the varnish himself by dissolving the flakes in methylated spirit.

Only in this way can he make sure that the varnish will have the expected insulating properties.

Not for Wireless Use

Much of the so-called shellac varnish sold in liquid form was never intended for wireless or electrical use and contains ingredients which greatly reduce its value as an insulator.

B.F.W.

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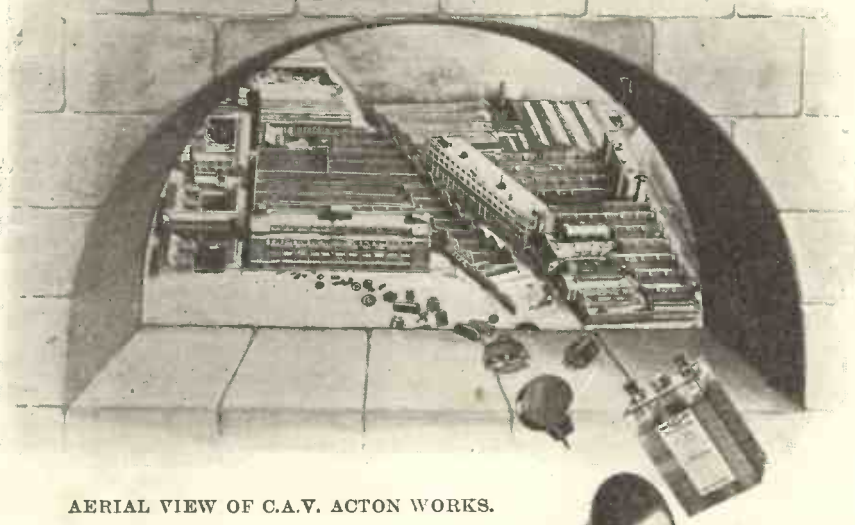

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Do.	Imitation Tortoiseshell Flare	1	10	0

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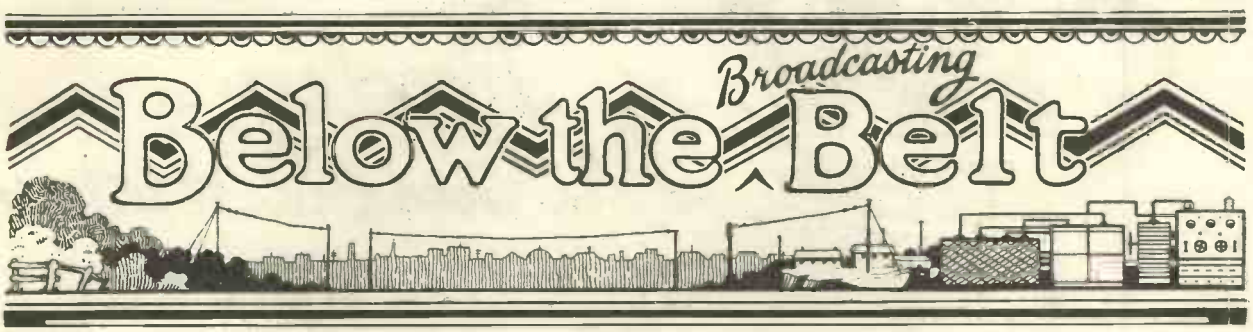
IN ADDITION TO THE ABOVE, OFFICIAL SERVICE STATIONS ARE ESTABLISHED THROUGHOUT THE COUNTRY.



THERE can hardly now be said to be any definite "season" for amateur transmission work; but outdoor claims are rapidly lessening, and so we can consider ourselves as just starting the winter session. This being so, it may be interesting to review what has been done during the past twelve months.

Thirty to Fifty

Work has almost entirely concentrated on the narrow wavelength—but broad frequency—band between 30 and 50 metres. On these waves communication has been kept up, by stations using not more than ten watts of input power, with the greater part of the continent of Europe during the hours of daylight. Between midnight and sunrise many of these low-power stations have been able to work with United States, Canadian, and South American amateurs. In some cases the power used has been below 5 watts. Remarkable!

The high-power stations, using 50 watts or more, have been in almost constant communication throughout the year with Australian and New Zealand amateurs. On favourable days it has been possible for stations using quite low power to work with their brother amateurs on the other side of the world.

The 20-metre Band

Very little has as yet been done on the 20-metre band. One of the reasons for this seems to be that very many stations have difficulty in persuading their receivers to work efficiently at this very high frequency. Another reason is that an experimenter who wants to try something new can be sure of finding a brother amateur to work with him round about 40 metres at any hour of the day or night. Recently I kept watch for ten minutes every hour between 5 a.m. and 1.30 a.m. the next morning. The only period in which I did not hear an amateur station, either calling or working, was at 10 a.m.! On the 20-metre band it is usually necessary to fix an appointment with another station before any work can be done.

There is a good deal of excellent telephony now to be heard round about 45 metres, much of it amateur, but some of it professional. I have been hearing some really good transmissions from a Dutch station, controlled, I believe, by the Philips Valve firm.

Re-transmissions

During the summer some of our high-power amateurs have been experimenting in re-transmitting the B.B.C. programmes on the 44-46-metres band, and an excellent job they have made of it. In many cases reports have come in from nearly all over the world. The ordinary transmissions were, of course, quite inaudible at these extreme ranges, though the power used was very much greater. I expect these experiments will be continued during the winter, and it is always worth while listening on 45 metres after the close of the usual B.B.C. programme, when dance music is "on the air"! Very few of our stations work between 8 p.m. and 11 p.m. because of the danger of interfering with the very unselective receivers used by some listeners.

There is still a great deal of work being done between 90 and 200 metres, though nothing like the amount on the lower band. During the week-ends really excellent telephony is to be heard in this band, and some very interesting experiments are being carried out.

Goodbye, 440

With regard to 440 metres, there is a movement on foot amongst British amateurs to abandon this altogether. It is of very little use for long-distance work, and there is a feeling that any experimental telephony work can be just as well done on 150-200 metres. The 440-metre band has been somewhat abused, particularly in the Midlands and the North, where telephony transmissions, of no apparent experimental value, have been done on any wavelength between 300 and 500 metres, to the exasperation of listeners searching for Continental stations on Sundays.

That Heaviside Layer

During the past twelve months much information has been gathered by amateurs on the subject of the influence of weather and atmospheric conditions on the range and readability of signals. As has long been suspected, the height and condition of the "Heaviside layer" has a great influence on the distance to which low-power signals can be heard. When this layer is in a good condition for reflecting or refracting the wireless waves, the reflected or refracted waves will far outstrip the ordinary earth-bound waves, and in such conditions quite low-power stations can be heard many thousands of miles away.

Now we are beginning to have some understanding of the fact that the condition of the atmosphere has an effect on the condition of the Heaviside layer. For one thing, both the sun and the moon would seem to have the power to cause "tides" in the layer very similar to the tides in the sea. It is established that signals travel better in the full-moon periods than they do in the new-moon periods. There is no doubt about it. The probable explanation is that the pull of the full moon puts the Heaviside layer into a very favourable position for the reflecting or refracting of signals to a long distance. The interesting point is that there is apparently only one atmospheric "spring tide," and that is at the full moon. If it can be proved that there are two atmospheric spring tides, as there are two ocean spring tides, at

full and new moon, then the explanation just given of the increased distance obtained during the full moon period must fall to the ground, for there is no doubt that at new moon long-distance work is at its worst.

Another interesting series of observations has shown that cyclonic conditions of the atmosphere disturb the Heaviside layer. A depression between a low-power transmitter and the receiver will often cause a great drop in signal strength.

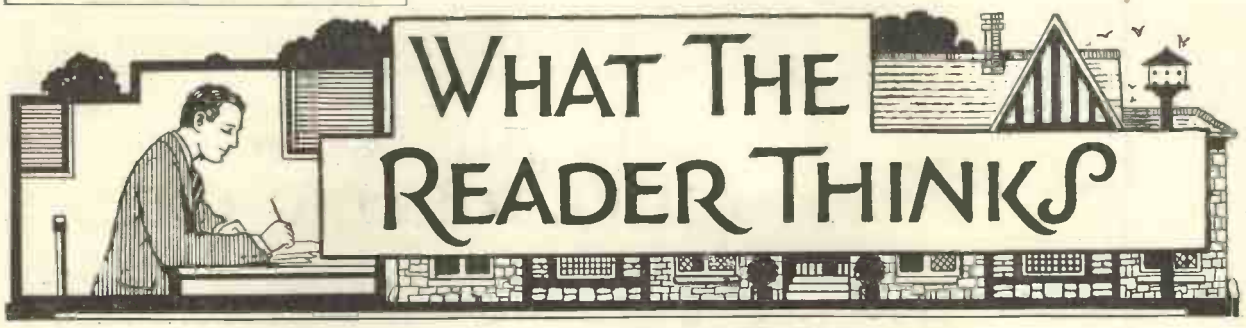
Yet another interesting series of observations concerns the effect of electrical disturbances on wireless waves. This summer many stations have observed and reported a sudden great gain in strength when a thunderstorm has broken within a few miles of a transmitting station. The cause of this is unknown.

Listeners and Short-wave Work

An ever-increasing number of stations, equipped for receiving only, are taking an interest in short-wave work. These stations, free from the constant care of maintaining a transmitter in a high state of efficiency, are able to devote themselves to observations of the most interesting and useful kind. Many of them work in the closest co-operation with transmitting stations that are "on the air" at definite and stated periods, and are able to provide very useful checks on reports from other stations. Of this kind are the observation on signal strength and fading recently carried out by six stations, only two of them being equipped with transmitting apparatus. The results obtained were of considerable value to the general work on these problems that is now being done.

The general tendency amongst these "listening" amateurs is to build one really good set that will serve for all wavelengths, rather than to have a B.C.L. set and another for purely short-wave work. In most cases this policy has resulted in a considerable improvement in the reception of broadcast, because a set that is really efficient on 45 metres must be a thoroughly good receiver, and is sure to give much better signals on the broadcast band than one that can barely be persuaded to work on 200 metres without breaking into uncontrollable oscillations, on the one hand, or, on the other, going so dead that it is impossible to hear anything at all, even telephony from a powerful near-by station.

5 Y M



WHAT THE READER THINKS

"*Mystery Transmissions*"

SIR,—With reference to Mr. Whiteside's letter in the July number of the WIRELESS MAGAZINE, he may be interested to know that I have also heard those so-called mysterious conversations.

I have been able to trace them as coming from the railway lines. I happened to know the speaker's voice and the station with whom he was working. I afterwards received confirmation of this from the person in question.—L. J. LOADER (South Africa).

Improving Loud-speaker Tone

SIR,—The tone of a loud-speaker or headphone may be varied in an easy and convenient manner. Obtain as many condensers as possible of the plug-in type of different capacities, and also two sockets for them. Mount the sockets on the panel and connect the two leads to the secondary terminals of the last stage transformer.

While the loud-speaker is working, plug in a condenser and notice the change in tone. Different condensers will give a different tone.—W. H. EDMUNDS (Essex).

Identifying Foreign Stations

SIR,—By making a graph I have found that stations heard before, yet unknown, can be identified. Over thirty unknown stations have been identified since, including Zurich, Berlin, Hamburg, Rome, Madrid, Barcelona, and San Sebastian.

It is also useful for finding the approximate tuning for a station whose wavelength is known.—W. H. DAVIS (Middlesex).

Long-distance Crystal Reception

SIR,—I have received on an ordinary parallel-tuned crystal set Hamburg, Frankfurt-am-Main, and Leipzig. Hamburg and Frankfurt can be received every night, and they can be very clearly heard.

Leipzig and a station on about 300 metres have been heard more than once. Radio-Paris can be easily heard at any time when Daventry is not working. The set is very unselective, otherwise one or two other stations might be logged.—H. M. RAMM (Berkshire).

Unusual Reaction-coil Effects

SIR,—Having built a 4-valve set similar to several others I had built, except that a choke replaced the first stage transformer, I found the set oscillated with the reaction coil away from the aerial coil, and did so even when the reaction coil was removed and the coil-holder short-circuited.

As the set was required immediately, I reversed the leads to the reaction coil, so that tighter coupling *reduced* the reaction. The set gave good results.

Later, it was found reaction was due to not having a condenser across the choke (an old transformer with primary and secondary in series). This was remedied and the reaction coil again reversed, when normal results were obtained. Peculiarly enough, the first results were better, so the condenser was removed and the set altered so that the reaction worked the wrong way again! C. WOODIWISS (South Africa).

Safety of Sets During Storms

SIR,—The following experience may be of interest to your readers. My three-valve amplifier, one transformer and two resistance-coupled stages, gave perfect results except for the presence of a loud humming noise. The effect of earthing the low-tension battery was tried without avail, and also that of cutting off the electric supply at the main.

It was then noticed that the set was standing on a large iron safe, and that on removing it to some distance from the latter the "background" became considerably quieter. The safe was then earthed, and this effected a great improvement with regard to the humming noise, which, though still present, is very low when the amplifier is resting on it. Would this arrangement be a safe one during a storm?—N. WILES (Leeds).

"*All-America Short-wave One-valver.*"

Sir,—The following experience with the "All-America Short-wave One-valver," described in the March issue of the WIRELESS MAGAZINE, may be of interest to short-wave enthusiasts. I made my own tuner of No. 18 gauge tinned copper wire (round). The grid coil, as directed, consists of eight turns, the aerial coil five turns, and the reaction 12 turns. Connecting to my P.M.G. aerial, the only signals I received were morse. I then slung a piece of flex 20ft. long across the room 6ft. above the floor, and connected to one side of the aerial coil. To the other side of the coil I connected my outside aerial. I immediately tuned in WGY on 32 metres; this was about 12 p.m., August 7th, and shortly after I received KDKA on 69 metres, both stations being quite readable and free from mush. I think it is a wonderful little set, considering its simplicity. I may say that this is my first real attempt to get down to the short waves, and I thank you for your diagrams and instructions. —A. E. RUTTER.

Sir,—In the August number of your excellent magazine, I was very interested in your article on your recent American visit, as only that very morning I had been listening-in for the first time to KDKA, on the "All-America One-Valver," described in the WIRELESS MAGAZINE a few months ago. The reception was excellent, and, although 8,000 miles away, the phone strength was equal to that of the Cape Town Station, two air miles from here, when listening-in on a crystal set. Every announcement was plainly heard. I am now going to build your two-valve amplifier, to use with it. If only England had a short-wave station, what treats we would have. Wishing your paper every success, and looking forward to the next number.—C. R. SLINGSBY.

Selected Replies to Readers' Questions

Separate H.T. Tappings for Four-valve Set

Q.—I have a four-valve set (HF—D—2LF), and there is at present only a single H.T. positive terminal for all the valves. How can I apply a separate H.T. voltage to each of the valves?—

A.—If you will have a look at the internal wiring of the set you will observe that each of the valve plates is ultimately connected to the H.T. positive terminal. Thus the first plate will be joined to this terminal through the anode tuning coil or through the primary of the H.F. transformer, whichever may be employed. The detector plate will be connected to H.T. positive *via* the reaction coil (if one is used), and the first L.F. coupling and so on.

What you have to do is to disconnect three of the plate circuits from the present single H.T. positive terminal and join each of them to one of three new terminals mounted in a convenient position on the panel.—L. A. C.

Aerials

Q.—When is a multi-wire aerial to be preferred to a single-wire aerial?—L. B. M. (*Sussex*).

A.—Hardly ever for reception work when the single-wire could have a length of 50ft. or over. If the space available is very restricted it might be of advantage to use a twin aerial, but more than two wires are desirable only when transmission is being carried out and a fairly large capacity to earth is required.—F. D. K.

Making the 'Duplex' Loud Speaker.

In the August issue of the "Wireless Magazine" very complete instructions were given to enable amateurs to manufacture a cone type loud speaker referred to as the 'Duplex' Loud Speaker.

We have to call attention to the following British patents, among others, owned by us, which relate to the cone type loud speaker:

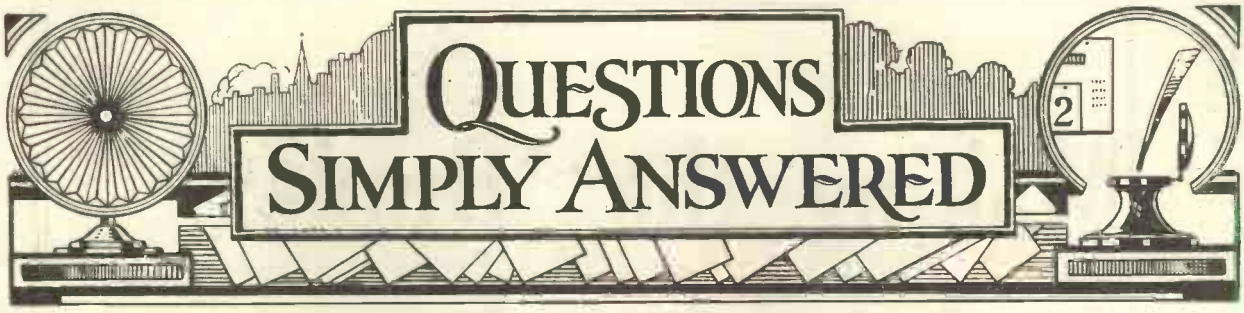
240,596 231,798 231,556 205,618
239,245 216,976 229,786 709,352
and 242,362.

While we have no desire to hinder, in any way, the advance of science or legitimate research on the part of those of scientific attainments, we intend to protect our rights and to proceed against any individual infringing our patents.

Standard Telephones and Cables Limited

formerly Western Electric.

Connaught House, 63, Aldwych, London, W.C.2.



Coils for Various Wavelengths

Q.—I know very little about wireless but have recently bought a receiver and tuning coils for the reception of B.B.C. stations. I have no wish to go to needless expense, but I do want to receive other stations and would, therefore, be pleased if you would tell me what other coils I shall need.—H. de C. (West Malling).

A.—First of all find out the value of the tuning condensers in your set. Then look up the list of British and Continental broadcasting stations in this magazine. Jot down the wavelengths in order and apply to any coil manufacturers of repute for a catalogue of coils and wavelength ranges.

From the lists in the catalogue you will be able to determine what numbers or sizes of coils you will require for aerial, anode and reaction purposes.

In this way you will get only the coils that are essential and no money will be wasted in purchasing a full set of coils some of which you may never use.

—L. A. C.

Electrostatic Reaction and H.F. Valves

Q.—I possess a single-valve set which employs capacity (electrostatic) reaction. How can I add an H.F. valve to this and at the same time retain this reaction in the aerial system?—P. F. (Swansea).

A.—Your suggestion is impracticable. You must either add two H.F. valves at once or connect the capacity-reaction condenser to the anode circuit of the single H.F. valve instead of into the aerial system.—M. B. D.

Adjusting Neutralising Condensers

Q.—I have a 5-valve neutralised receiver consisting of 3 stages of H.F. and have been unable to adjust the neutralising condensers correctly. Will you please explain the procedure necessary to adjust these components to the best value?—R. A. (Woking).

A.—Switch on and tune in your set to the local station in the usual manner and when strongest signals are obtained withdraw the first H.F. valve. Signals will still be heard, but by adjusting the first neutralising condenser you should be able to eliminate or nearly eliminate signals.

Leave the neutralising condenser set to the point where weakest signals are received, insert the first-valve and withdraw the second valve. Now set the second neutralising condenser to a point where the weakest or no signals are heard and replace the second valve.

Adopt the same procedure for the third H.F. valve and, when adjusted, correct neutralisation will be obtained.—L. A. C.

Reservoir Condensers

Q.—I propose building a receiver that makes use of three 2-microfarad H.T. battery condensers. As I intend using H.T. accumulators is it advisable to retain the use of the above-mentioned condensers or may I, with safety, dispense with their use?—C. M. (Margate).

A.—Although the primary use of these condensers is to act as a reservoir and smoothing device for the current obtained from the H.T. battery their further use is to by-pass radio and audio-frequency pulsating currents across the H.T. battery.

If these currents are left to force their way across the H.T. battery some damping and distortion is likely to result. It is, therefore, the better practice to retain them, regardless of whether dry cell or accumulator H.T. batteries are employed.—K. F. M.

Negative-bend Rectification

Q.—Having heard very gratifying reports concerning the superiority of negative-bend anode rectification over grid-leak rectification, as far as purity of reproduction is concerned, I should like to try the arrangement myself in my own single-valve receiver. Can you explain what alterations I must make to my existing set?—J. P. (Putney).

A.—Cut out your grid-condenser and leak and connect the aerial end of your tuner direct to the grid of the valve. Now connect a 300-ohm potentiometer across the L.T. battery and add two extra terminals to your panel.

Disconnect your earth terminal from either positive or negative L.T. (as the case may be) and connect earth to one of these extra terminals. The other terminal should be joined to the sliding contact of the potentiometer.

A grid-bias battery should be connected up to these two terminals, the positive of the battery being wired to that terminal actually joined to the slider of the potentiometer. The negative wander-plug of the battery should be connected to the other terminal, which is in turn joined to the earth terminal.

For best results the correct adjustment of the grid battery voltage must needs be found by experiment.—L. A. C.

Best Earth

Q.—Which is the better earth, a pipe earth or a sunken plate earth?—O. S. (Kent).

A.—To give a satisfactory answer to this question a little consideration is necessary. It is agreed by most wireless engineers that a satisfactory earth is not reached unless embedded at least three feet below the surface of the ground, provided the surface of the ground is level for some distance around the spot where the earth is made.

If the pipe has a greater surface area toward the ground below the three feet line than the sunken plate then the pipe will form the better earth. A plate of large dimensions with its surface parallel to the surface of the ground will often prove to be the best earth provided it is sunk deep enough to comply with the above-mentioned conditions.—G. E. F.

Super-het Receiver

Q.—I find that I get my local station at 4 or more settings of the oscillator condenser on my super-het. set and am unable to receive any other station. Can you tell me the cause of this and a remedy?—J. H. (Kensington).

A.—This is caused by your oscillator valve not working correctly. Try increasing the H.T. to this valve or increasing the coupling of plate to grid coil and also coupling coil in the oscillator coupler. These suggestions should remedy the trouble.—L. A. C.

Leclanché Cells for H.T. Supply

Q.—Finding dry-cell H.T. batteries become exhausted so speedily when used for my six-valve set, I have decided to use wet batteries. Do you consider that Leclanché cells are quite satisfactory for this purpose, as these appear to be the simplest that can be employed, both from the point of view of recharging and economy in upkeep?—S. R. (Bolton).

A.—Leclanché cells will be found to be quite satisfactory for supplying current to the plates of a multi-valve receiver. The initial expenditure will exceed that for dry batteries, but as it is possible to recharge them they will be found to effect an economy in H.T. battery upkeep.—L. A. C.

Catalogues and Pamphlets

Copies of the catalogues and pamphlets mentioned below can be obtained post free if the WIRELESS MAGAZINE *is mentioned.*

INCLUDED in a batch of leaflets recently received from the Radi-Arc Electrical Co., Ltd., of Bennett Street, Chiswick, W.4, is a particularly interesting one dealing with the Licity electric soldering iron, which is supplied in three weights, and can be used with either D.C. or A.C. supply.

When choosing a wireless cabinet, the handy 20-page booklet issued by the Carrington Manufacturing Co., Ltd., of 18-20, Norman's Buildings, Mitchell Street, London, E.C.1, will form an interesting guide, as a wide range of boxes and cabinets is detailed therein.

Small folders which give concise details of Ediswan receiving sets, H.T. and L.T. accumulators, and the new G.P.4 and P.U.4 valves, are obtainable from the Edison Swan Electric Co., Ltd., of 123-5, Queen Victoria Street, London, E.C.4.

Technical details and data relating to Ferranti type A.F.3 and A.F.4 transformers are contained in a new pamphlet, Wb401, issued by Ferranti, Ltd., of Bush House, W.C.2.

Lists, giving full technical details of the recent additions to the Six-Sixty range of valves, have been received from The Electron Co., Ltd., of Triumph House, 189, Regent Street, London, W.1.

Considerable price reductions in Clix Taper Plug Sockets are announced by Autoveyors, Ltd., of 84, Victoria Street, Westminster S.W.1, and List No. 264 gives full particulars and prices of these useful gadgets.

Three interesting booklets are issued by the General Radio Co., Ltd., of Radio House, 235, Regent Street, London, W.1. One deals with their new 2-valve receiver, the second is packed with unsolicited testimonials, while the third forms a complete catalogue of this firm's excellent products.

Of unusual interest are the particulars received concerning the Felcourt Press Button Set, which is manufactured by Felcourt Products, Ltd., of Greater Felcourt, East Grinstead, England. Some useful information may be gleaned from the small booklet sent.

The Brown Budget for August makes extremely interesting reading, and besides a host of interesting details of Brown products there is a full description of the new Dix Loudspeaker. S. G. Brown, Ltd., of N. Acton, are the publishers.

THE WORLD'S BROADCASTING

A Guide to the Principal European and American Stations.

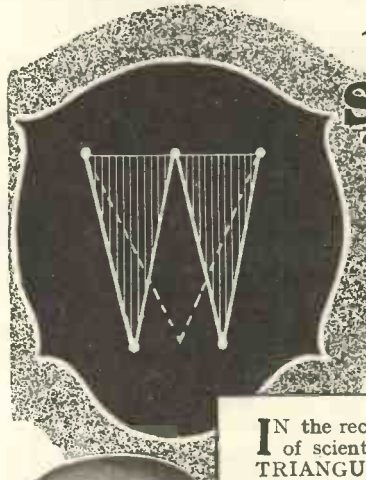
The New Wavelengths.

When consulting this list of broadcasting stations—which has been specially prepared by the WIRELESS MAGAZINE *from authoritative information—it should be noted that the new wavelengths are not expected to come into use until the middle of October. Until then the old wavelengths that are given in the last column should be followed.*

Kovno (given as 219 metres) may work on 344·8 metres; Leningrad (given as 223·9 and 940 metres) may work only on 434·8 metres; and Helsingfors (given as 240 metres) may work on 375 metres.

New Wavelength in Metres.	Station.	Call Sign.	Old Wavelength in Metres.
201.3	Karlscrona	SMSM	196
204.1	Gefle	—	208
211.9	Kiev	—	281.9
217.4	Luxemburg	LOAA	1,200
219	Kovno	—	—
222.2	Strasburg	—	205
223.9	Leningrad	—	940
225.6	Belgrade	HFF	1,650
229	Malmo	SASC	270
238.1	Bordeaux	PTT	411
240	Helsingfors	—	318
241.9	Königsberg	—	462
245.9	Toulouse	PTT	280
250	Gleiwitz	—	251
252.1	Stettin	—	241
	Montpellier	—	220
254.2	Kiel	—	234.5
260.9	Gothenburg	SASB	290
265.5	Brussels	—	486
272.7	Norrköping	SMVV	260
	San Sebastian	EAJ8	343
	Cassel	—	273
275.2	Zagreb	—	350
	Madrid (F)	EAJ4	340
	Angers	—	275
277.8	Seville	EAJ17	300
	Barcelona	EAJ13	462
	Caen	—	332
280.4	Barcelona	EAJ1	324
283	Dortmund	—	283
285.7	Reval	—	350
288.5	Edinburgh	2EH	328
	Hull	6KH	335.5
	Plymouth	5PY	338
	Nottingham	5NG	326
	Sheffield	6FL	306
	Stoke-on-Trent	6ST	301
	Liverpool	6LV	331
	Swansea	5SX	482
	Dundee	2DE	315
291.3	Lyons	Radio	280
294.1	Liege	—	280
	Bilbao	EAJ11	418
	Trollaattan	SMXQ	345
	Bradford	2LS	310
	Dresden	—	294
297	Agen	—	318
	Hanover	—	297
	Carthagena	—	330
	Jyvaskyla	—	301.5
	Leeds	2LS	321.5
303	Münster	—	410
306.1	Bournemouth	6BM	386
309.3	Marseilles	PTT	351
312.5	Newcastle-on-Tyne	5NO	404
315.8	Milan	—	320
319.1	Dublin	2RN	397
322.4	Mount Propect	WJAZ	—
322.6	Leipzig	—	452
326.1	Belfast	2BE	440
329.7	Nuremberg	—	340
331.3	Springfield	WBZ	—
333.3	Reykjavik	—	327
337	Copenhagen	—	347.5
340.9	Paris	Petit Parisien	333
344.8	Seville	EAJ5	357
348.9	Prague	—	368
353	Cardiff	5WA	353
357.1	Breslau	—	418
361.2	Oakland	KGO	—
361.4	London	2LO	365
365.8	Graz	—	402
370.4	Oslo	—	382
375	Madrid	EAJ7	373
379.5	Schenectady	WGY	—
	Troy	WHAZ	—
379.7	Stuttgart	—	446
384.6	Manchester	2ZY	378
389.6	Radio Toulouse	—	430
394.7	Frankfort-on-Main	—	470
400	Bremen	—	279
	Aalesund	—	—
	Koszice	—	2,020
	Warsaw	—	480
	Falun	SMZK	370
	Cadiz	EAJ3	355
	Mont de Marsan	—	390
405.2	Newark	WOR	—
	New York	WJY	—
405.4	Glasgow	5SC	422
411	Berne	—	435
416.4	Minneapolis	WCCO	417
416.7	Stockholm	SASA	428
422.6	Rome	1RO	425
428.6	Hamburg	—	392.5
434.8	Bilbao	EAJ9	415
441.2	Brunn	OKB	521
447.8	Paris	FPTT	458
454.3	New York	WJZ	—
454.5	Boden	SASE	1,200
461.5	Bergen	—	357
468.8	Elberfeld	—	259
476.2	Lyons	PTT	480
483.9	Berlin	—	504
491.5	New York	WEAF	—
491.8	Aberdeen	2BD	495
	Birmingham	5IT	479
500	Zurich	—	513
	Helsingfors	—	522
508.5	Antwerp	—	265
517.2	Vienna	—	582.5
526.3	Riga	—	480
535.7	Munich	—	485
545.6	Sundsvall	SASD	545
555.6	Buda Pesth	—	560
566	Orebro	—	237
	Berlin	—	571
577	Madrid	EAJ6	392
588.2	Linkoeping	—	467
	Vienna	—	531
720	Ostersund	—	720
760	Geneva	HB1	760
810	Odense	—	810
850	Lausanne	HB2	850
940	Leningrad	—	—
1,000	Basle	—	1,000
1,010	Moscow	Popoff	1,010
1,060	Hilversum	HDO	1,050
1,150	Ryvang	—	1,150
1,150	Sorö	—	1,150
1,300	Berlin	LP	1,300
1,350	Karlsborg	SAJ	1,350
1,450	Moscow	RDW	1,450
1,600	Daventry	5XX	1,600
1,750	Paris	SFR	1,750
1,800	Norddeich	KAV	1,800
2,125	Amsterdam	PCFF	2,125
2,650	Paris	FL	2,650

Duo-triangular-filament suspension



The New SIX-SIXTY Point One Valves!

IN the record of the development of scientific valve design, DUO-TRIANGULAR FILAMENT SUSPENSION will always be hailed as "The achievement of 1926."

The phenomenal advantages arising out of this unique, yet simple construction are amazing. To begin with, it is obvious that the length of filament employed in our new Point One Valves is almost double that in the usual type—represented by broken lines—with the result that a much greater electron emission is ensured; and further, none of this valuable electron steam is wasted since the entire filament is wholly enclosed within the grid and anode. And remember, the special Six-Sixty filament itself is wonderfully economical. Its current consumption is barely .1 amp., and when operating at the rated voltage there is absolutely no sign of "glow."

Then, too, the stability and pertect alignment resulting from the additional supports render it unnecessary to assemble the filament in tension, and ensure a constancy of perfect reception. Engineers for years past have realised the stability of the Warren Girder, but it was left to Six-Sixty to apply this to the design of the radio valve.

The story of success cannot always be told in a few words. Our subsequent advertisements will reveal the structure of the perfect Valve, built on the foundation of Duo-Triangular Filament Suspension.

Descriptive leaflet, S.S.9-26, free on application

S.S.1. Bright Emitter General Purpose Valve, 8/-.
S.S.2., H.F. D.E., H.F. and Detector, 14/-.
S.S.3., H.F. and L.F. D.E., .06 amp., H.F., L.F. and Detector, 14/-.
S.S.4. D.E., Power Amplifier, 18/6.
S.S.5. D.E., Power Amplifier, 18/6.
S.S.6. D.E., Power Amplifier, 18/6.
S.S.7. D.E., .1 amp., Power Amplifier, 18/6.
S.S.2A., H.F. and L.F. D.E., .1 amp., H.F., L.F., and Detector, 14/-.
S.S.8. D.E., .1 amp., General Purpose, 14/-.
S.S.9. D.E., .1 amp., Power Amplifier, 18/6.
S.S.10. D.E., 2 volts, .15 amp., Power Amplifier, 18/6.
S.S.11. D.E., Power Amplifier, 18/6.

These prices do not apply in the Irish Free State.

SIX SIXTY

SIX-SIXTY VALVES
Better by Six Times Sixty

The Electron Co., Ltd., Triumph House, 189, Regent St., LONDON, W.1. IA.

The New Combination

LOTUS GRID LEAK and Buoyancy VALVE HOLDER

Patent No. 256833. Pro. Pat. No. 20339

The Grid Leak is not discernible, being totally enclosed in Bakelite Valve Holder Base.

Yet Another LOTUS Triumph in Component Design

Like all other LOTUS Components, the new Combination Grid Leak and Valve Holder is guaranteed efficient in construction and design. It eliminates unnecessary wiring and soldering, and makes for economy in cost and space.

Ordinary Terminal Valve Holder **2s. 6d.**
Without terminals **2s. 3d.**

Combination Grid Leak and Valve Holder 3s. 9d.

All Anti-Microphonic Type.

LOTUS

Combination

GRID LEAK and Buoyancy VALVE HOLDER

Anti-Microphonic.

From all Radio Dealers, or write for List.

GARNETT, WHITELEY & CO., Ltd.,
LOTUS WORKS, Broadgreen Road, LIVERPOOL.

OUR WIRELESS CLUB RELAXES

Scene. The club-room of the Wugglingham-on-Wuggle Wireless, Scientific and General Club (The W.W.W.S. and G.C.).

Time. Any old time.

All the members are talking but no one listens.

"No, I don't believe in reflex circuits, and no more do I believe in low loss. All you want in a single——"

"I could hardly believe it. Do you know with the phones on the table——"

"Yes, you may get it that way, but you can work it out much more quickly by using the formula

$$(2x^2+\tfrac{1}{2}y)=\sqrt[2]{\frac{ap(y)^4}{\frac{xo}{y}-\frac{22}{341}(p)^3}}.$$

Well, now, if you differentiate both sides, you get——"

"Talks! Talks! Nothing but talks. 'The Psychology of the Shrimp,' 'Do Radishes Cause Roman Noses?' Do they? Who cares? Pah! Why last night do you know I put the phones on and all I heard was——"

"Ever get KDKA on the short waves? I got down to 45 metres the other evening and——"

"Well, I told him he had made a mistake in his filament circuit, but did he believe me? Not he! So he stuck in his wander plug and blew the whole jolly lot out. Talk about——"

"After that I took my driver, and topped the confounded thing. I feel sure that the caddie blinked. . . . Well, perhaps what I said was a little strong, but——"

"Yes, yes, quite so. You remember that neutralised set of mine. I tried it——"

"Hallo, just the man I wanted to see. You know that transformer you borrowed several weeks——"

"Excuse me, old man. Snortleton over there wants to speak to me."

"No, I don't agree with half these new-fangled notions. Now when I took up wireless, in the old days, if we got PCCG two Sundays running——"

"Oh, I say, did you hear that new fox-trot last night? It goes like this: '*Rum-te-tum-te-rumbte-te-tum*——"

"Heard that one about the Scotsman who went into a wireless shop and said——"

"Paid yours yet?"

"Hardly. I saw at once that mine was all wrong; they were miles out of it, and I went down to see 'em. If all income-tax offices are in as bad a state as this one it's no wonder that they make mistakes. I saw a funny little chap with baggy trousers and a beard. No flies on him, though. Well, somehow we got talking wireless, and I told him about that new super-het of mine, the stations I could get, and all that sort of thing. And what do you think he said? If I had a set like that he felt sure that I had understated my income. I tell you——" J. A. D.

Do You NEED ADVICE?

Do not forget that the Technical Staff of the Wireless Magazine *is always at your service to help you out of your difficulty and put you on the right path.*

If you want advice on buying a set, address your query to the Buyers' Advice Bureau, not forgetting to mention how much, roughly, you wish to spend, where you are situated, what stations you wish to receive, and whether you intend to use phones or a loud-speaker for listening-in.

In all other cases, address your letters to The Editor, and not to the Buyers' Advice Bureau. Our address is the Wireless Magazine, *La Belle Sauvage, E.C.4.*

When sending a query, write on one side of the paper only, and do not forget to enclose the coupon on page iii of the cover and a stamped addressed envelope for a reply.

A SCHOOL FOR BROADCAST ACTING?

Numerous discussions have been held from time to time respecting the proper development of what is termed radio drama; by which is meant drama and other classes of plays suitable for broadcasting and independent of the visual aid which is an essential of the ordinary theatrical play. The B.B.C. has been working without precedent; its Dramatic Department has been more or less groping in the dark to try to discover the type of play that will appeal with the greatest force to listeners; it has followed, and is following, a definite line of action in the broadcasting of specially prepared versions of theatrical plays which have proved successful on the stage.

Experiments have been based on Shakespearean productions and on short, as well as fairly prolonged, versions of well-known plays, such as *Lady Windermere's Fan, The Way of an Eagle, Milestones* and *A Chinese Honeymoon*. These are part of a series which will be continued in order to test public feeling; and in view of the certain renaissance of drama in England, the B.B.C. intends to put on Greek plays, Elizabethan plays, etc.

But there is another angle of the problem to be considered. Broadcasting is evolving a new type of play, and it is inevitable that it should evolve a new type of artist. It must not be regarded as invariably the case that the finished stage star is best adapted to the requirements of the studio. Indeed, some of the most prominent actors who have appeared before the microphone have realised that stage technique is useless to them in the confined and not entirely sympathetic atmosphere of the broadcasting studio; other eminent artists, for the same reason, have been diffident about broadcasting at all.

It is desirable, therefore, that some special kind of training should be considered for young artists who wish to follow broadcasting as a specialised calling.

Negotiations between the B.B.C. and the Royal Academy of Dramatic Art have been carried on for some time past, and as a result a special course of training will be instituted at the Academy this month (October), with the object of discovering talent that can be utilised for the broadcasting medium.

IS THERE AN ETHER DRIFT?

The recent experiments carried out at the Mount Wilson observatory in which Professor Wilson claims to have detected the existence of a relative movement or drift between the earth and the surrounding ether have become the subject of wide controversy in the scientific world.

If the Mount Wilson results can be substantiated they will have the effect of upsetting the classical Michelson-Morley experiments, upon which much of Einstein's revolutionary doctrine of relativity is based.

In the first place it must be admitted that the Michelson-Morley experiment had been repeated time and again, using the most perfect apparatus available and taking the utmost precautions against every possible source of error, but always with a negative result, so far as detecting any ether drift is concerned.

Professor Thirring, of Vienna, now points out that a comparison of the mean values of the Miller observations shows systematic deviations as large as the full amount of the "drift" itself at certain hours of the day. In other words there is a possible 100 per cent. error in the Mount Wilson measurements.

On the whole, Professor Thirring concludes that the "drift" observed by Professor Miller is to be attributed to local disturbances, rather than to any cosmic cause such as the all-pervading ether.

EARTH'S MAGNETIC FIELD.

In connection with the successful long-distance results secured by Professor Rogers using an aerial consisting merely of a 3ft. iron rod buried in the ground, the suggestion has been made that even short-wave radiation must be largely "earth-bound."

Mr. W. M. Massie, for instance, maintains that wireless signals are not true ether waves, but consist of a wave motion in (or a disturbance of) the "magnetic field" of the earth which is known to extend from pole to pole.

The signal disturbances are propagated through this magnetic field, and follow the curvature of the earth just as a tidal wave follows the surface of the ocean. It is known that the strength of the natural earth currents vary from day to day, and this is stated to explain the peculiar fluctuations observed in signal strength.

The stronger the earth currents, the stronger will be the resultant magnetic flux, and the greater the distance over which the signals will travel. Again the signal disturbances favour the track of the natural earth currents, which to some extent accounts for the existence of good and bad areas of reception.

A FAMOUS WIRELESS SHIP.

Amongst the many superstitions with which sailors are credited is one against the re-christening of a ship. I wonder if the sailor of to-day holds to this superstition.

Whether he does or not, I think it is a great pity when the name of a famous ship comes to be altered with a consequent loss of the old records one associates with that particular vessel.

Take, for example, the good ship *Victorian* with its early wireless associations. You will doubtless remember that, in 1920, Mr. Arthur Burrows, late of 2LO, now of Geneva, crossed the Atlantic in the *Victorian,* and maintained wireless telephonic communication with Chelmsford for the first thousand miles out from Liverpool.

Six years ago such a feat was a tremendous achievement. Moreover, this particular feat associated with the *Victorian* was one of those things which marked the beginning of our present era of wireless broadcasting.

Does it not seem a pity, then, that the *Victorian* is now no longer known as such, but rides the waves as the *Marlock* these days? I wonder if the wireless operators of the *Marlock* ever give a thought to the achievements of "Uncle Arthur" when crossing the Atlantic in 1920.

Apart from its associations with the early days of broadcasting, I have a great personal interest in the old *Victorian,* for I happened to come back to England from Montreal in that vessel soon after Uncle Arthur's famous voyage in her.

Really, I don't think they ought to have changed the name of a ship in which both Uncle Arthur and I have crossed the Atlantic, do you?

HALYARD.

Soldering simplified

The Fluxite Soldering Set will solve your soldering problems for ever. Everything from an aerial connection to a big multi-valve set may be soldered quickly and successfully with this simple soldering set.

The Fluxite Soldering Set is exceptionally suited for Wireless; it is simple and compact, and will last for ever. It contains a special "small-space" soldering iron with non-heating metal handle, a really efficient pocket blow-lamp, Fluxite, solder, and full instructions.

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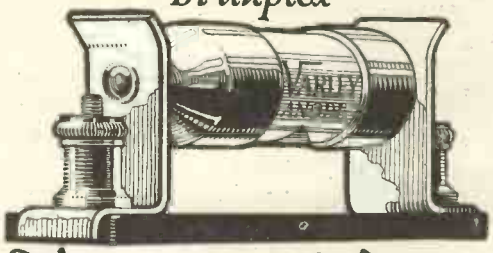
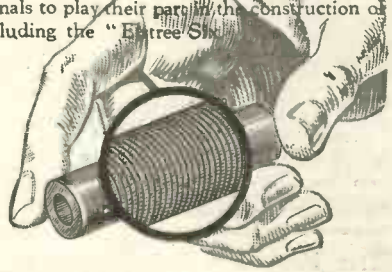
The Varley Constant *Bi-duplex*



Wire-wound Anode Resistance

It's the perfect design and construction of the interior—the part that really counts—that we are proud of. Varley Wire-Wound Anode Resistances have upheld our reputation as coil winding specialists; they have been chosen by the scientific experts of all the leading wireless journals to play their part in the construction of all the big sets of 1926, including the "Entree Six."



Look at our famous Bi-Duplex system of winding. Every turn of bare wire is separated by a strand of pure silk, thereby preventing any possibility of shorting under the varying potentials in use. And remember too, the Varley is non-inductively wire-wound, another factor which makes for the wonderful purity of tone obtainable only with this form of intervalve coupling.

Lastly, Varley Wire-Wound Anode Resistances are absolutely constant and unaffected by atmospheric conditions. A little dearer perhaps, but if you value constancy—and constancy means that you can *rule out* all falling off in your wireless reception—you will insist on a Varley, the perfectly constructed and scientifically designed Anode Resistance.

	PRICE
Up to 50,000 ohms	**5/6** each
Without clips and base	**4/-** each
60,000, 80,000 and 100,000 ohms	**7/6** each
Without clips and base	**6/-** each
150,000 200,000 and 250,000 ohms	**9/6** each
Without clips and base	**8/-** each

Write for particulars of our new Multi-cellular High Frequency Choke—wire wound on the famous Varley Bi-Duplex System.

VARLEY

Constant always

THE VARLEY MAGNET CO. (Proprietors: Oliver Pell Control Ltd.),
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Telephone - - - - - - City 3393.

How a Broadcaster Regards the Broadcasting Stations

I HAVE broadcast from six of the B.B.C. stations, and each of the stations is entirely different from all the others, and the difference is more marked than that which one finds between two halls or buildings.

The main difference between speaking into a microphone in a B.B.C. studio and speaking to people in a hall or drawing room is that in the studio a broadcaster has a choking feeling. This is not the result of nerves.

I have spoken in all kinds of places and at all times, but I have never experienced this choking feeling except when broadcasting.

The voice does not carry as it does in a hall or ordinary room; everything is so arranged that the voice will not carry. No wood is exposed, no metals are observed.

It sounds Irish to say that everything conspires so that the voice shall not carry, when we all know that the voice carries hundreds of miles outside the studio. The voice, however, falls "dead" on the microphone.

There is generally no echo; if there is it is very slight. The more dead the voice the better the microphone will receive it. That is why the deep voice carries better than the high one.

The carpets, tapestries, curtains, and nets of a studio are all conducive to this "deadness," and it is this that causes the choking feeling in the broadcaster.

The best and easiest station to broadcast from is London. Probably more time and money has been spent on this station than on any other in order to bring it up to the state of perfection it is now in. There is less deadness here than in any other station. The broadcaster is less conscious of his own voice here than anywhere else. One's voice does not come back like a boomerang to the extent it does elsewhere. The whole studio is "lighter."

Daventry pitches up the voice of the speaker or singer, and it is easy for a singer to get out of tune, and a speaker to get into a shout. Daventry is as difficult as London is easy.

Cardiff is more receptive than even London, but the choking feeling is worse here than anywhere else. One's voice seems to be filling the whole studio after failing to get an outlet through the microphone.

Manchester studio is the lightest studio to speak in, but there is a slight echo there, which makes it difficult to concentrate on the matter in hand.

Much will be done to bring up these stations to perfection, but even then, there will be a difference between each, easily detected by the speaker or singer.

E. E. R.

A New Excuse

I daresay there is no need for me to tell you that the British schoolboy is amongst the most energetic of wireless amateurs in this country, and not only amongst, but well in advance of, many.

Possibly you have a sample of the schoolboy wireless expert in or around your household, and you may even have seen such a one construct a "low-cost" receiver from component parts "borrowed" from your wireless junk heap.

It is just possible, also, that you may know a schoolboy who is interested and occupied in the transmitting side of this wireless business of ours.

At any rate, I am certain there is no doubt in your mind as to the capabilities of the British schoolboy on the technical side of wireless.

I wonder, though, if you know of any schoolboy who has interested himself so much on the artistic side of wireless as to appear before the microphone at a broadcasting station. I had not heard of such a case until I attended speech day, a few weeks ago, at a well-known grammar school in a Midland county.

In the course of his speech on the occasion in point, the headmaster of this grammar school said:—

"A new excuse has been added this year to my list of homework excuses. I thought I knew them all, but, no. The new excuse was, 'Please, sir, I could not do my homework last night as I was broadcasting from Nottingham.'"

You can imagine the amusement this new and very modern excuse caused, and can't you just picture my tying a knot in my handkerchief to remind me not to forget to pass this new excuse on to you at the first opportunity?

EXAMINER.

The "Wireless Magazine" Buyers' Guide

(Numbers in brackets indicate issue in which advertisement appeared.)