

W. JAMES on TACKLING THE BROOKMAN'S PROBLEM

Amateur Wireless

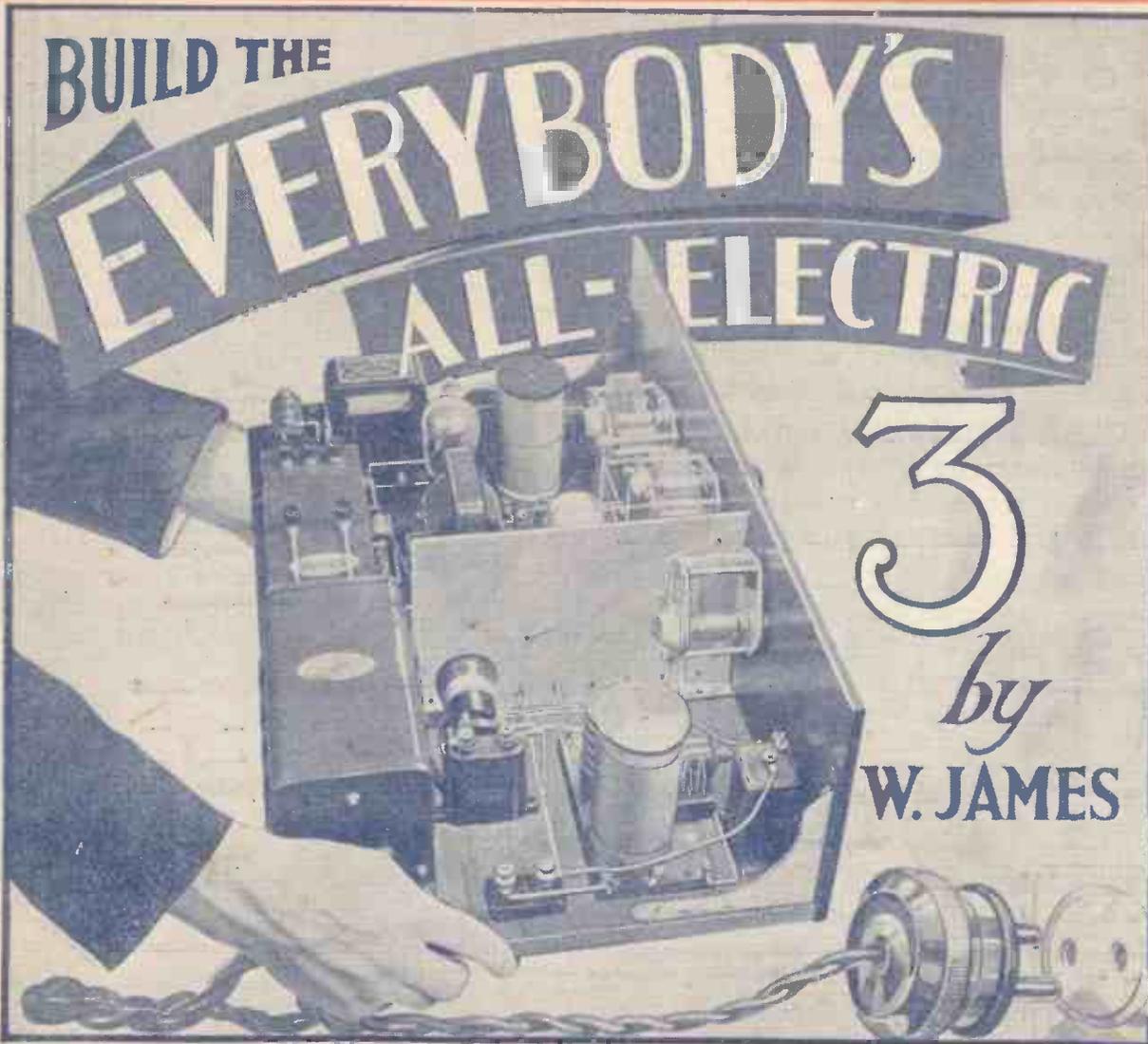
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Every
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Saturday, February 22, 1930

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3
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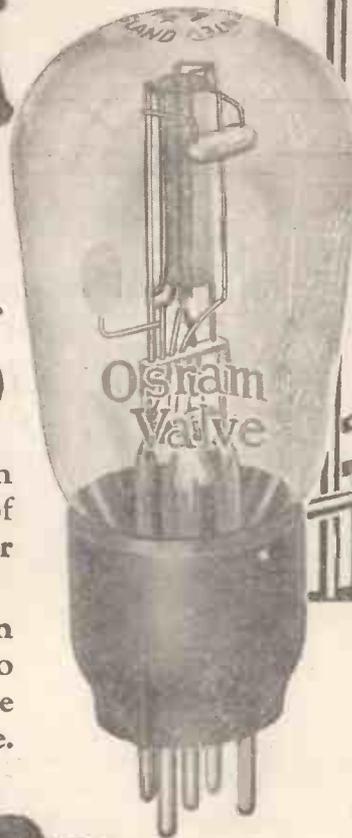
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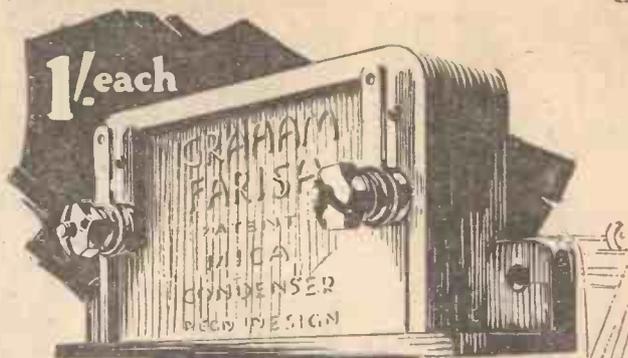
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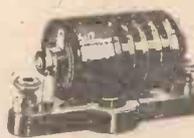
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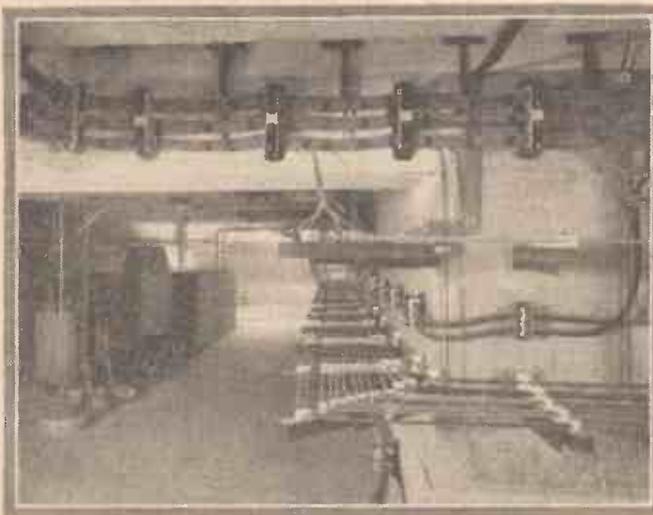
The Leading Radio Weekly for the Constructor, Listener and Experimenter

— Editor: BERNARD E. JONES —

Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E. :: Research Consultant: W. JAMES :: Assistant Editor: H. CORBISHLEY

Those Traps!—Listening to the “Discovery”—A Beam from London to Japan. —Odious Comparisons!—Record Costs—B.B.C. Chairman to Leave

Those Traps!—A Daily Mail radio engineer has been having some fun recently proving to doubting readers that a simple little wave-trap, costing 2s. 11d., will form an effective cure in many reported cases of wipe-out. He ought to try our “Brookman’s By-pass”! Frankly, we are glad to find such support of the policy which we have persistently pushed since the opening of the “B.P.’s”—namely, that lack of selectivity is a fault cheaply and easy to cure in 999 cases out of the proverbial 1,000. The odd one case is probably living in the highly-desirable residential neighbourhood of Brookmans Park, and is trying to work a five-valve set on a hundred-footer!



An unconventional peep into Brookmans Park! In the vault a tank has been installed in connection with the water-cooled valves, and here also are the numerous cable runs.

Listening to the “Discovery”—Following the publication in a recent issue of a photograph of the “last radio station in the world”—a lighthouse radio station at a southern coastal point of South Africa—which is in touch with the radio-exploration ship *Discovery I*, many readers have written asking if it is possible to listen to the signals from this romantic Antarctic boat. It is. The signals will be weak, and it may be a freak of reception if you get anything. The wavelengths being used are: Spark—600, 705, and 800 metres; short waves—26.59 and 36.50 metres.

A Beam from London to Japan—One doesn’t hear much of the Naval Conference after the broadcast of H.M. the King’s speech at the opening ceremony: but the delegates haven’t forgotten radio. Mr. Reijiro Wakatsuki, the chief Japanese delegate to the Naval Conference, broadcast an appeal by beam wireless to Japan from London last week. The speech was heard perfectly in Japan.

Odious Comparisons!—The

cost of issuing a licence has been mentioned frequently during the past few weeks, but of equal importance is the cost of the licence itself. We think, with the large majority of listeners, that 10s. represents good value for money. Of course, there are some who don’t think so—notably a man who wrote and said: “For 7s. 6d. per

annum you can licence a dog and have some real fun. You can licence a gun for 5s., and shoot yourself at once, but it costs 10s. to bore yourself to death in a year with a wireless set!” Odious comparisons!

Record Costs—Surely it would be more fitting to compare the costs of gramophone and radio entertainment? For 10s. you can get one good 12-in. and one good 10-in. record. For the same sum spent in radio you get a whole year’s entertainment. Of course, the licence fee isn’t quite the end of the matter, but with modern dry batteries and eliminators, radio running costs are remarkably low.

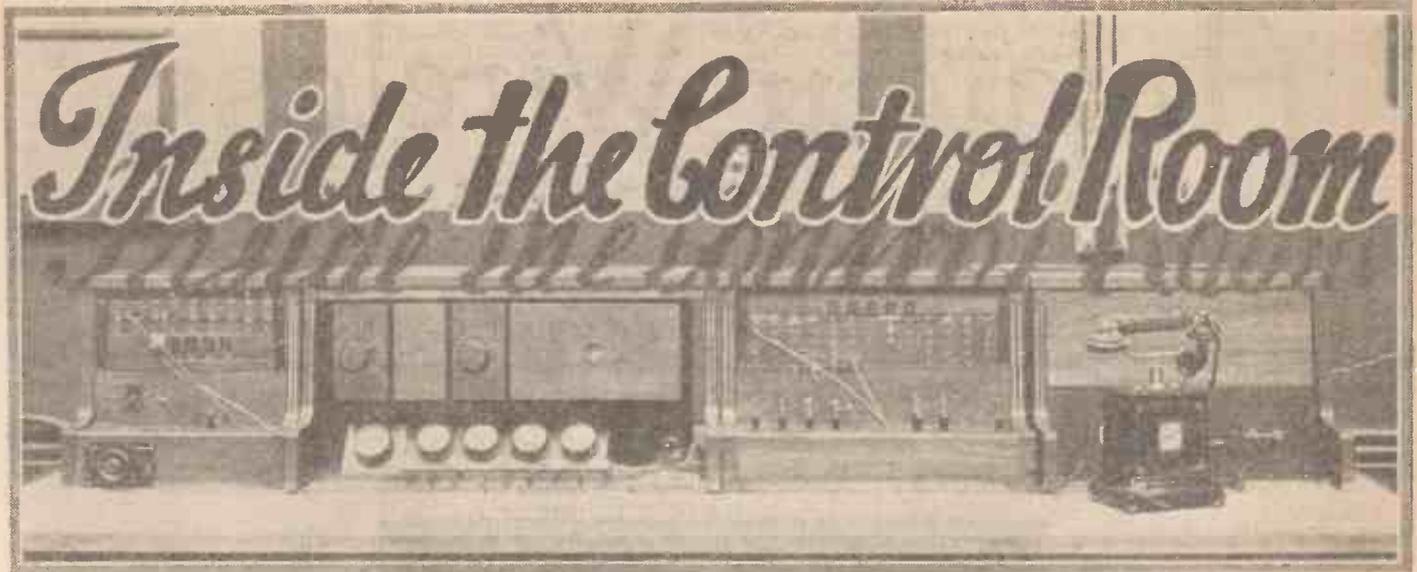
A Convict gets PCJ!—Prison conditions in the States seem rather lax! Occasionally one hears realistic descriptions of the royal time enjoyed by American gaolbirds. Nevertheless, the PCJ station director was agreeably surprised to receive a recent report from the Missouri State Penitentiary! One of the prisoners, who gave his identity as No. 32400, stated that he regularly listened to PCJ with a four-valve set, which he had designed and built himself while “engaged on State business.”

B.B.C. Chairman to Leave—The Earl of Clarendon, present chairman of the B.B.C., is leaving to take up the appointment of Governor-General of South Africa. This will leave vacant the chairmanship of the B.B.C., which Lord Clarendon has held since 1927. It carries with it a salary of £3,000 a year. His appointment as Governor-General carries with it a salary of £10,000 a year. There is great speculation at present as to who is likely to take the vacated position.

A New Mains Set—W. James’ “Everybody’s All-Electric 3” is described this week. Next week will be given further details. Follow this up, you mains-users!

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By An "A.W." Representative

IN view of the correspondence between "Thermion," of AMATEUR WIRELESS, and Mr. Noel Ashbridge, the B.B.C.'s chief engineer, on the subject of the control room—given in full in last week's AMATEUR WIRELESS—it may not be out of place to explain just what a control room is and how such a section of the B.B.C. ever came about.

You might truly say that there has been a control room of sorts ever since broadcasting began. Adjoining the little studio at the top of Marconi House—familiar to the first broadcasters in 1922—was a still smaller room housing an L.F. amplifier for the carbon-type "mikes." This amplified the microphone currents before they passed to the actual transmitter in another room down the passage. A crude volume control on this amplifier enabled the engineers to adjust the input to the modulator so that the grid swings were not too great.

This room had to be called something. A cardboard notice on the door said "Control Room." The name stuck, and the

gigantic terminus of the S.B. lines and the multi-station volume controls for the whole B.B.C. network are contained in what is still known as the "control room."

There are control rooms at each studio centre, of course. The very latest, *le dernier cri*, as one might say, is at the new Manchester. Savoy Hill is not yet so up to date. When the new Broadcasting House is complete it will have a control room on Manchester lines, but much larger.

The control room at Savoy Hill is typical of current B.B.C. practice. The actual job of the control room is this. In it are the strength controls for each studio; there are the "mixer" controls, enabling various effects from the effects room to be added to any transmission; they enable, too, the echo room to be used in conjunction with any studio; there, also, is the terminus of one section of the simultaneous broadcast lines, so that the Savoy Hill studios can be used to supply the programme for almost any station.

All these jobs may be required—and

frequently are—at the same time. Two of the studios, say, may be occupied for rehearsals (which means two volume controls at work), and one of the producers may require both the echo and the effects rooms to be linked up with his particular studio. Three other studios may be in use, simultaneously, for a 5GB programme, and the rest may be taken up by a programme for London and for general simultaneous broadcast.

There will be, then, many strength controls all going at the same time, mixer controls, and S.B. line switching! And it is absolutely vital that there should be no mutual interference.

Volume Control

How often have you been interrupted in a telephone conversation by cross-talk on another line, picked up at the exchange? It is very difficult to prevent this, in commercial telephone work. It is still more difficult to prevent this on the private B.B.C. lines. No complaints of interference have yet been received, however, which have been traceable to faults in the control room. Nor is that ever likely. That, at least, is one feather in the control room's cap.

The control of volume is one of the main jobs in the control room. This can be done primarily by the master control and, secondarily, by the various faders in use at the time, say, for changing over from one studio to another. All the faders and mixers are really complicated types of potentiometers with contacts arranged so that there is no clicking or other intermittent noise heard in the movement. Meters above each knob show the electrical result of the altered setting.

For definite types of broadcast—for example, news bulletins and stock announcements—the control settings are practically standard. In the case of musical broadcasts

(Continued at foot of page 286)



This view of the inside of a control room clearly explains the various units

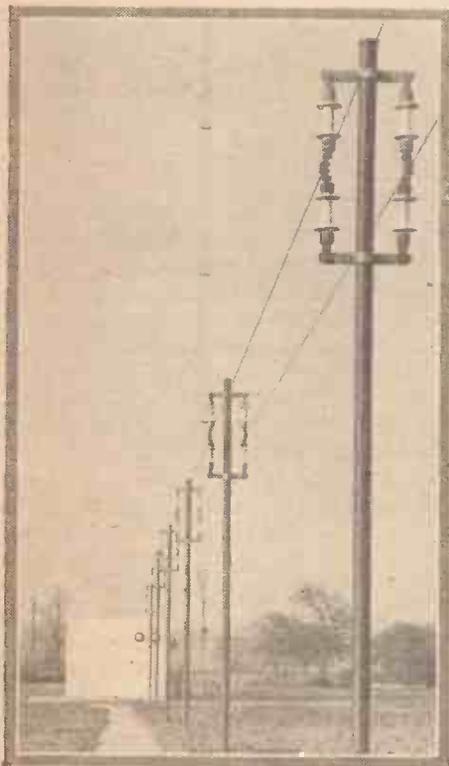
IN spite of the ample warning provided and the amount of technical information published from time to time, the transmitters at Brookmans Park are causing an amount of trouble to numerous listeners.

The problem, briefly, is first to separate two stations working on wavelengths of 356 and 261 metres (or 842 and 1,148 kilocycles) and, secondly, to hear them at no more than normal

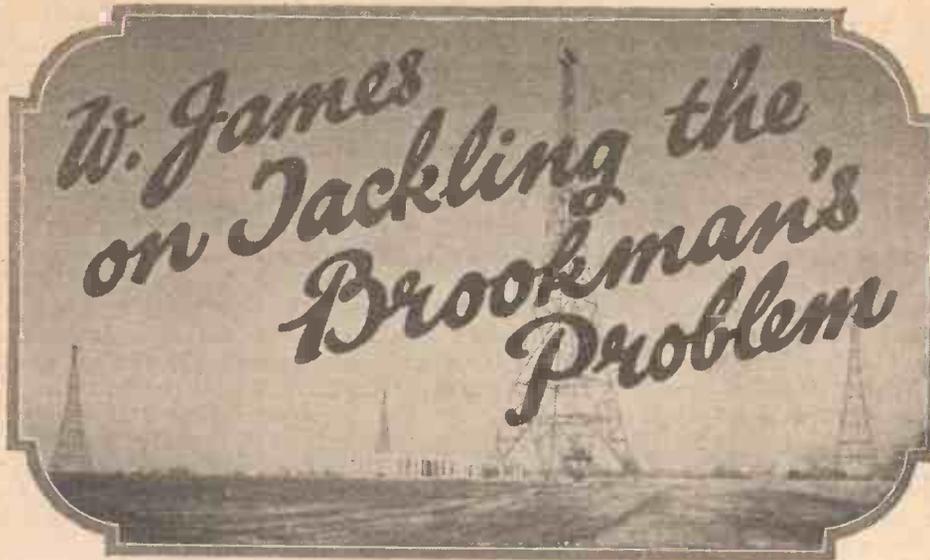
strength. This second part of the problem means, usually, that a good volume control must be fitted in order to avoid overloading.

Now, what is the strength of the signal collected by the aerial and set up across the ends of the first tuning coil? This depends upon various factors, the first being the actual position of the aerial with respect to Brookmans Park. The strength decreases as we go away from the station, but, owing to shielding and absorption effects, the strength at a spot five miles to the north may be greater or less than the strength five miles to the south, or east, or west, for that matter.

A second factor is the size of the aerial



The high-frequency feeder lines to one of the aerials at Brookmans Park



The essential points to remember when trying to solve the difficulties of the twin Brookmans stations are :

- (1) The size of the aerial,
- (2) The value of a fixed or adjustable aerial condenser,
- (3) The coupled circuit,
- (4) Grid-bias adjustment,
- (5) The avoidance of stray couplings,
- (6) The use of a volume control.

A full explanation of these points is given in this article.

and earth and its effectiveness. Its height, length, and construction, and the nature of the earth connection are factors which help to decide the effectiveness of an aerial system. We know that height in particular

is of importance, and so is the length of the top part. Aerial insulation, too, plays a not unimportant part.

Tuning Arrangements

It is, therefore, to be expected that aerials will vary greatly in their powers of collecting signals. The third factor is the construction of the tuning coil and how it is connected to the aerial and the first valve. Coils vary greatly in their effectiveness. Some types have relatively great losses, and, therefore, the voltage of the signal set up across their ends is very much less than when a good coil is used. Certain plug-in type coils and others of the dual-range type are very poor indeed. Some patterns provide me with about one volt when tuned to either of the Brookmans stations, whilst a 1930 Binowave coil gives me four or five volts when used with an aerial having 60 ft. of wire.

This voltage is pretty considerable, and is far greater, I am sure, than many readers would have thought. Actually, at my home I get more voltage than this, and can run a loud-speaker from the detector—anode bend—though, of course, not very loud.

When such large voltages are applied to the first valve something is sure to happen. I have connected a microammeter in the grid circuit of the first shielded valve in a set and noticed the amount of the grid current set up by the signal itself. The

circuit of Fig. 1 is, in this connection, of interest. It comprises the tuned circuit, valve voltmeter of the anode-bend type, and a normal three-valve set having a stage of shielded-valve high-frequency amplification, but only the first valve is shown. I tune to the London regional station first with the S.G. valve out of its holder and note the reading of the meter in the valve-voltmeter; it may be 4 volts. Then

I put the valve back in its holder.

What happens? Two things of importance. The first is that the voltage falls to about one-third and the second is that now the signal is received over a much greater part of the scale of the tuning condenser.

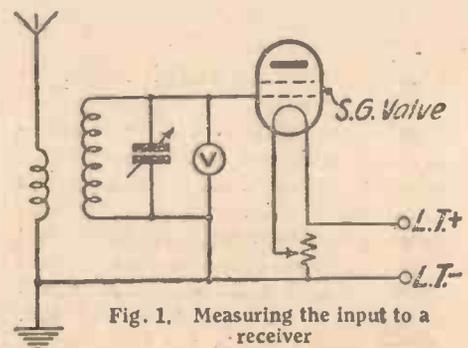
This simple experiment indicates, first, that the shielded valve passes grid current and, secondly, that this lowers the voltage and broadens the tuning. Obviously, the S.G. valve is being over-loaded, and the question, therefore, arises as to the suitability of many types of S.G.

valves as at present manufactured. I will deal with this in a future article, however.

Watch the First Valve

The particular point that I desire to emphasise just now is this: That in numerous instances the first valve in the set is not being given a chance, and as a consequence it tends to produce interference.

By connecting grid bias, or a condenser



in the aerial circuit, or by reducing the size of the aerial, the voltage is reduced, or, in the case of grid bias, the over-loading effect is minimised. When the first valve happens to be a detector the results will depend upon the type. If anode bend is used, and the grid bias is correctly set (and, of course, the high-tension), the strong signal is easily rectified. A suitable valve must be used, however. Thus, when

W. JAMES on "TACKLING the BROOKMAN'S PROBLEM" (Continued from preceding page)

the high-tension voltage is limited to 120 volts, the amount of the grid bias is restricted according to the characteristics of the valve used. For a resistance-capacity type 4.5 volts may be the limit, or 5 volts when the valve has only a moderate impedance. This last value would be the one to use when the signals are strong, and could, no doubt, be followed by a low-ratio transformer working into the power stage. With no over-loading in the detector stage the selectivity of the circuit would be practically that with the detector disconnected.

Tuning Effects

A leaky-grid detector would very seriously affect the tuning. The strong incoming signal tends to produce an amount of grid current which, in turn, flattens the tuning of the circuit. Tuning would be very broad, and probably the detector would distort. To avoid this distortion the input ought to be reduced by an aerial condenser, cutting down the length of the aerial, or by other means to be mentioned below.

From these remarks it is clear that the place to look for the trouble being experienced is *before the first valve*; that is, between the aerial and the first valve. A single circuit tuner is not selective enough. It passes too wide a band of frequencies.

The truth is that few sets are properly designed. Possibly simplification has been carried too far. A return to the circuits of early broadcasting days is about due. I am not advocating the return of numerous knobs and switches. What I do state most emphatically, however, is that the old circuits would be far better suited to present-day conditions than many of those now so widely used.

We used not to fit wave-traps or other similar devices. They are old, it is true, and have their uses.

Plain tuning, properly carried out, is probably the best solution, and will undoubtedly be universally adopted in due course.

Meanwhile, a coupled circuit may be fitted with good results. It may be placed outside the set and be tuned in the usual way, being coupled by a tuning condenser as indicated in the diagram, Fig. 2. The aerial is joined to the new circuit and magnetic coupling is avoided by using a practically fieldless coil or by so placing it

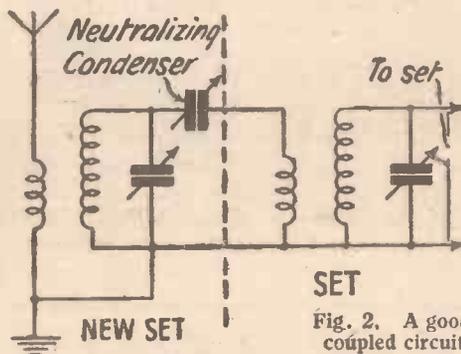


Fig. 2. A good coupled circuit

that there is no transfer of energy when the coupling condenser is removed. Therefore, no signal should be heard when the coupling condenser is removed entirely.

Stray Couplings

With many sets the signal will be heard. The various connecting wires, coils, and other parts collect the strong local-station signal. To test for stray couplings of this nature in sets having an S.G. stage, remove the wire from the filament of the S.G. valve, or, if there is a filament rheostat, turn it off. Probably you will still hear the local station. Now, the signal is not, in all probability, due to the fact that a very tiny condenser is formed by the grid and anode of the valve. What is hap-

pening is that the signal is passing from the aerial circuit to the detector circuit by stray capacitive and magnetic couplings.

Thus the aerial and anode coils may be coupled together, due to the fact that a pair of plain coils are used. This is a common fault. Alternatively, they may not be properly shielded and have a small capacity with one another. Perhaps the tuning condensers are coupled.

The wire connected to the anode of the shielded valve may be acting as a small aerial and other couplings may exist. Probably a little attention will remove some of them.

Try putting the coils a little farther apart. Also, see that the aerial wire does not pass near the coils. Minimise the stray couplings with the object of ensuring that the signal collected by the aerial passes through the tuned circuits before reaching the detector.

Volume Control

Finally, if the set is without a high-frequency volume control, fit one without delay. A variable condenser joined in the aerial circuit will help. Also fit a filament resistance to the shielded valve when one is used, or, if they are of the alternating-current type, put an adjustable high-resistance in the shield circuit. These resistances should be used as volume controls and for the purpose of adjusting the apparent selectivity.

Recently I tried a well-known kit set not having a high-frequency volume control, and found that the two Brookmans stations could not be received clear of one another. The volume, too, was excessive and the quality poor, because of overloading. I fitted a resistance to the filament of the S.G. valve. When it was turned down the volume was ample, and the tuning was greatly improved.

"INSIDE THE CONTROL ROOM"

(Continued from page 284)

of any importance, the control man follows a duplicate score and arranges so that the *ppp* and *fff* do not cause total silence and blasting respectively.

Plays are the bugbear of the control engineers. Usually the modern type of broadcast play involves the use of at least four studios, apart from effects and echo. A signal board down in the control room tells the engineer when to fade from one studio to another, but the major part of this work is controlled by one of the play producers at a separate dramatic control board, and he, too, works with the play MSS. at his elbow.

The general appearance of the Savoy Hill control resembles a telephone exchange. This is chiefly because at this junction the S.B. line switching is done with P.O. plugs and jacks. This is stated to be not the best



An impression of Désree Ellinger

type of switching for this work, and at Manchester a new method of switching is used.

An essential part of the London control is the studio indicator. This is operated electrically from the studios, and tells the control man which studios are in use and which controls have to be operated. The most frequent series of events is that a normal broadcast is taking place in one studio, the announcements are being made in the talks studio, and the next item is being prepared in yet a third studio.

It is the job of the control man to "fade" naturally from one item to another via the announcement. It seems only like turning knobs, and it should be the heart's delight of the confirmed radio knob-twiddler! But there's a catch in it somewhere. Musicians, and not strictly technical engineers, are stated to be engaged on control-room work.

BROADCAST ARTISTES IN PICTURE



MURIEL BRUNSKILL.—This fine singer, a member of the late B.N.O.C., and heard most recently at the Wagner concert from the People's Palace, Mile End, has filled every principal operatic role.



PERCY MERRIMAN.—No matter to what heights Mr. Merriman reaches on the variety and entertainment halls, he will always be remembered for his organisation, as well as personal acting, in that unimitable war concert party, "The Roosters."



OLIVE GROVES.—One of the most frequent broadcasters, Miss Groves has also won honours with the latest Decca records. She has a fine soprano voice of wide range.



JACK PAYNE.—To all those who dance, Mr. Jack Payne's has become a household name, due to his masterly handling of the B.B.C. Dance Orchestra.



PATRICIA ROSSBOROUGH.—Miss Rossborough both broadcasts and records syncopated piano music.



HARRY F. BENTLEY.—A well-known player from 5GB. His 'cello recital was relayed from Birmingham on February 20 through 5GB. Both tone and technique are impeccable.



ETHEL WILLIAMS.—Known both for her pianoforte and vocal recitals, this well-known broadcaster is vocalist in most of the big oratorios. She is also a member of the Birmingham Repertory Company.



WILLIAM MICHAEL.—One of the earliest members of the B.N.O.C., Mr. Michael has played every principal operatic role, and it is hard to say in which he excels the most. He holds both operatic and concert honours.



ISOBEL BAILLIE.—A fine soprano, heard from nearly all stations, her most recent success was with the Hallé Orchestra. She has a wide range and noteworthy diction.

Where Portable Sets Score

Some of the undoubted advantages of portable wireless are explained in this test report of the Marconiphone Model 55, which, in the hands of "The Set Tester," has given exceptionally good results in the Fetter Lane Laboratory.

MOST listeners have given up the idea that a good wireless set can be made really portable. Vest-pocket radio is still an inventor's dream—or nightmare! But portables, and that larger class of set called transportables, have undeniable attractions. I think the biggest attraction of a portable is its "self-containedness." There is something satisfyingly conclusive about a portable; you set it down, anywhere, and it plays for you at the turn of a switch.

Flat-dwellers, and hundreds of listeners who cannot possibly erect an aerial wire, turn inevitably to portables as a solution to their radio installation problems. How easy it must be for a good salesman to sell a portable. He can demonstrate it to his "prospect," who, if satisfied with the performance, can take away the instrument with no more palaver than when buying a table gramophone.

We are often told that battery-operated portables are unduly costly in maintenance. But are they really any more so than an ordinary battery-operated set? I do not think so. Plenty of listeners use the small-capacity high-tension battery (of the type included in most portables) to run ordinary sets having external accessories. These sets often take just as much high-tension current as portables.

Two months' life is all that can usually be expected from a high-tension battery in a portable set. I know many non-portable battery sets that will run down the high-tension battery just as quickly.

As an enthusiast where portables are concerned, I was specially pleased to try the new Marconiphone model 55. This extremely satisfying portable costs 18 guineas. But remember that is an inclusive figure. Set-buyers often overlook this point. A non-portable set costing, say, £12 is only the nucleus of a complete installation. A portable is the installation.

A Marconiphone portable is on my desk

as I write. It is tuned to Radio Paris, which, even here, in Fetter Lane, is coming through at excellent strength and quality. The various generator noises that trouble us with ordinary sets are subdued, thanks

Every set referred to in this regular feature by "The Set Tester" has reached a certain standard of efficiency in the "Amateur Wireless" Laboratory. Reports are not given on sets that fail to reach this standard. This will explain why reports that do appear express general satisfaction with the set's performance.

to the enclosed frame aerial. Portable sets, because of their small aerials, undoubtedly cut down a lot of local interference. This is another scoring point for portables.

For a self-contained five-valver, the Model 55 is unusually compact. It is not

fixed inside the lid at the back of the portable.

Superficially, Model 55 is ridiculously easy to operate. Tests confirm this first

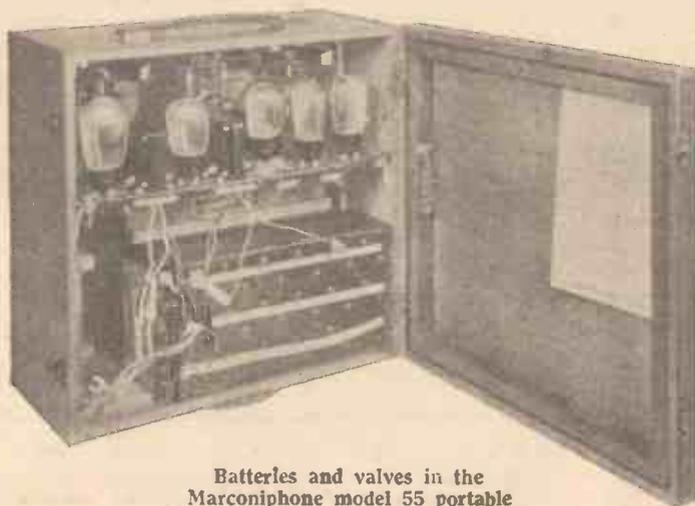
impression. I have seldom worked a more simple five-valver. Reaction must be gently applied, otherwise there is a tendency for distant stations to be paralysed. Initial tuning efforts are simplified by reference to the calibration chart

This chart clearly shows the disposition of the five valves and the connection to the high-tension, grid-bias and low-tension batteries. Useful tuning notes are included. I found the calibration chart worked out very accurately in practice.

The back lid, inside which is wound the frame aerials, swings open to reveal the five-valve chassis, mounted on a platform above the battery compartment. Using the batteries supplied with the set, everything fits very snugly into place. All the battery connections are accessible. The battery wander plugs are a good, tight fit in their sockets. Should they work loose, it is a simple matter to expand the sheath on the plug. Tight connections to the batteries are essential in a portable set.

The life of the high-tension battery supplied should not be less than two months. Although there are five valves, the total anode-current consumption in the model tested was only 10 milliamperes. The battery is not, therefore, very badly over-run. The accumulator for the low-tension supply should give about forty hours service between successive charges.

Everybody who has heard the Marconiphone model on test has commented on the excellent quality of reproduction. This may reassure those who retain the belief that all portables give bad quality reproduction. This Marconiphone model gives exceedingly good quality.



Batteries and valves in the Marconiphone model 55 portable are easily inspected by opening the door at the back. The space on the left is for the accumulator

very heavy, certainly not heavy enough to strain one's heart in transportation. The cabinet is attractive in finish, as are the cabinets of all Marconiphone sets. This portable should harmonise well with all normal furnishing schemes. Hard knocks, which all portables must expect to receive, will not harm the cabinet of the Model 55.

The simple control panel, carrying thumb-controlled tuning and reaction discs, together with the combined on-off and wave-change switch, is let into the top front of the cabinet. Below it is the loud-

Elisabeth Schumann

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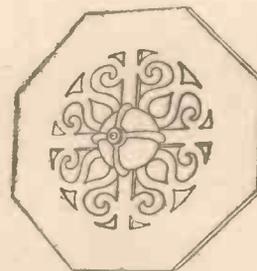
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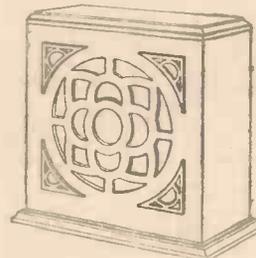
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Using Electric Mains

Lists of New
Apparatus, by
J. H. Reyner

Six New Sets
Reviewed for
Your Choice

HOW TO CUT OUT INTERFERENCE

W. James in his article on the Brookman's "Wipe Outs" gives particulars of two forms of wave-trap which will interest readers living in neighbourhoods where either of the Brookman's is of the nature of a devastation at those times when one wishes to tune-in less powerful stations operating on near-by wavelengths.

GRAMO-RADIO SECTION

A New Principle of Amplification, by H. T. Barnett, M.I.E.E.; Two Kinds of Gramo-Radio To Fit Your Machine; Around the Turntable, with Whitaker-Wilson, the "W.M." Music Critic, who also reviews the latest records.

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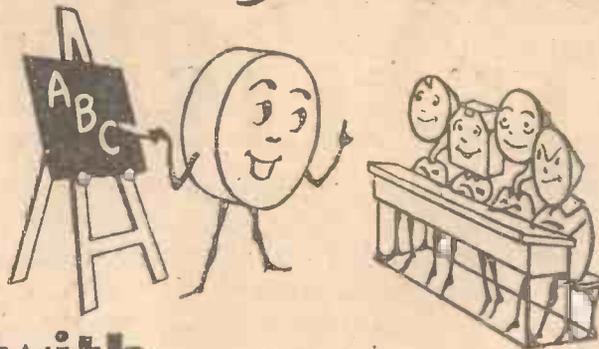


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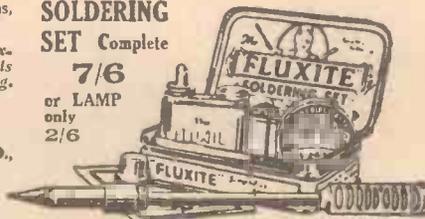
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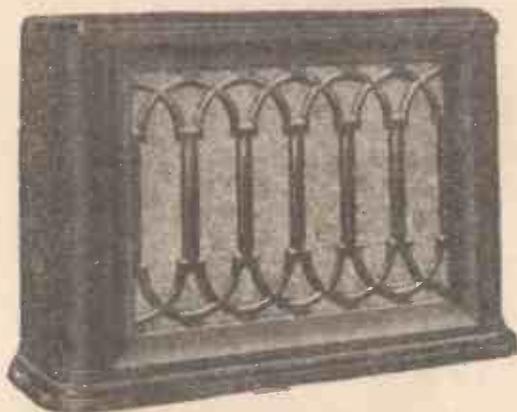
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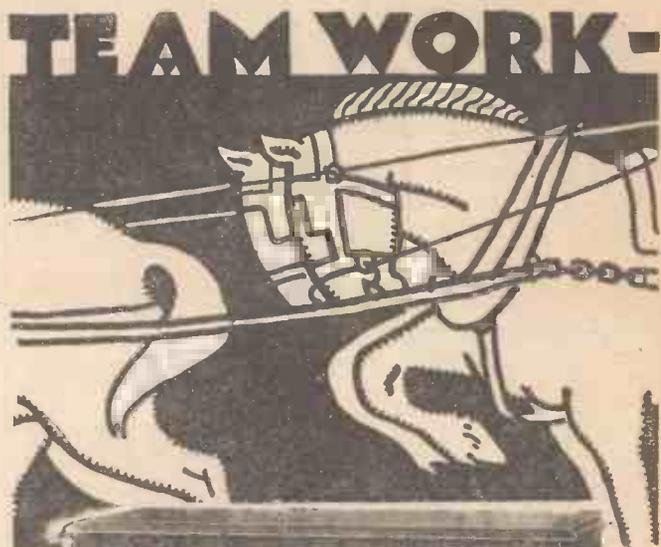


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On Your Wavelength!

Ink-spilling

THOUGH he cannot claim to have counted them one by one, your "Thermion" calculates that he has now completed his first million words for AMATEUR WIRELESS. To the reader who is not used to thinking in thousands of words this number may not convey very much. It does, however, represent the amount contained in about twelve full-sized novels. A still more appalling thought is that a speaker spouting continuously would require to talk for five days and nights on end in order to get a million words off his chest. Years ago, I remember, a man said to me: "I don't see how you'll be able to go on writing about wireless, for in a month or two you'll have said all that there is to say." I told him that nobody will ever have said all that there is on the subject, since something new will always be coming along. And that prophecy seems to have been borne out pretty well, in fact. Really, the trouble is not to discover things to write about, but to find the time to write all the things that one wants to say about wireless.

Wave-trapping Tips

The number of people who make use of wave-traps has increased enormously since Brookmans Park lifted up its twin voice and AMATEUR WIRELESS came to the rescue with suitable "silencers." Those who use the AMATEUR WIRELESS traps and carry out the instructions given by their designers won't find that Brookmans Park gives them a great deal of trouble. I am always coming across, though, people who have purchased wave-traps of one kind or another and are not getting the best out of them. Very often it is a matter of not finding, after a quarter of an hour's experimenting, which is the best tapping to use. That, of course, depends enormously upon how close you are to the transmitter and what sort of aerial you have. If Brookmans Park is a good many miles away almost any tapping will give trapping effects of a kind, though if you live almost on his doorstep you will find that it pays handsomely to try one after another until you discover which is the best.

Remember, too, that not every aerial and every set is suited by a particular kind of trap. In some cases the acceptor gives the best results, whilst in others the rejector is the only thing that will do the trick. I have come across quite a number of people who don't realise what fine adjustments are needed in setting a trap in the first instance. In a good trap with a low-resistance coil the tuning is very sharp and it is essential to obtain exact

resonance. If the trap is adjusted a little to one side or the other of the resonance point, the local station will not be cut out to anything like the extent that it ought. Spend a little time over adjusting your trap and you will reap the benefit in the results obtained.

The Superhet. Question

A week or two ago I mentioned that, owing to the much-increased selectivity that now prevails, we might see more and more of the super-heterodyne receiver during the coming months. Since then I have met a very large number of people who are coming more and more to hold the same view. The great points about the superhet. are that it is exceedingly simple to work, having only two tuned controls, that it is much more selective than any straight set with less than three or four tuned circuits, that it brings in an astonishing number of foreign stations at loud-speaker strength even in daylight, and that it does not require an outdoor aerial. Its drawbacks are these. To be effective it must have from seven to nine valves, which means, of course, that it is not so cheap to construct as a straight set incorporating S.G. and pentode valves. Running costs are also higher, owing to the greater amount of filament and plate current consumed. It seems to me, though, that you get your money's worth in the larger number of programmes that become available. Since AMATEUR WIRELESS designers are always ready to oblige when there is a demand for any particular form of apparatus, will those readers who would like a super-het. design let the Editor know?

Popular Elsewhere

The superhet. is immensely popular abroad; in fact, one reason why British sets have not a larger market in France is that the French do not like straight circuits. This is interesting because the French certainly ought to know, for the great majority of them have to indulge in long-distance listening even to hear their home programmes. You see, with the exception of Toulouse, all of the big French stations are located in and around Paris. The others are mostly of the relay type, and French friends tell me that even those rated at $1\frac{1}{2}$ kilowatts or so have very small service areas. I have heard one or two French super-heterodyne sets, and I can assure the reader that they leave nothing whatever to be desired in the matter of quality. Their selectivity is superb, the way in which one station can be picked out from the general medley being simply astonishing. Most of the best sets are nowadays fully screened, and this

makes a tremendous difference, not only in their stability, but also in their running costs. Lots of the old super-hets. had to be stabilised by applying positive damping by means of a potentiometer, and this, of course, meant increased H.T. current. By the use of screening and of suitable circuits the H.T. drain is kept surprisingly low.

Plenty of Bass

Some time ago I championed the balanced-armature loud-speaker unit and was bold enough to say that if properly mounted it was capable of bringing out as much of the bass as most people want. Several expert friends set about me roundly for daring to say anything of the kind. They showed that no drive of any kind can bring out any note with a pitch below about 200 cycles and told me that I was talking through my hat. However, I stuck to my guns and went on using B.A. units with complete satisfaction. The joke is that recent laboratory tests have shown that most good balanced-armature drives do give an excellent response right down to 50 cycles! Any reader who has a good pick-up can test this out for himself by means of those excellent standard-frequency gramophone records that are now obtainable. He will find that the really big booming notes are genuinely there. The whole secret is to obtain a first-rate unit, to adjust it carefully, and to use it in conjunction with exactly the right cone. Don't use a fixed-edged cone of large size. You will find it far better to employ a light one of smallish size so freely suspended that when it is not fixed to the connecting rod of the drive it can be moved a considerable distance by blowing gently into it. A baffle-board is, of course, essential, and this should not be less than 2 ft. square.

Shortening the Aerial

For present-day conditions the long aerial is a distinct disadvantage, owing to the way in which it reduces selectivity and brings in interference of various kinds. What one wants to do is to find the roof length that will give just the right degree of selectivity combined with reasonably good signal strength. Here is a simple and inexpensive way of making an experiment that I have found exceedingly useful. Don't start by chopping up your comparatively expensive 7/22, but set about the business in another manner. Take down the stranded aerial wire temporarily, choosing a calm day, and rig up a temporary aerial consisting of a single strand of No. 16 or No. 18 copper wire. Suppose that your original roof was 60 ft. in length. With your copper wire try a roof of 50 ft., and note the effects upon selectivity and

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On Your Wavelength! (continued)

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signal strength. This having been done, lop off a further 10 ft. and try again.

Shortening, by the way, is done simply by snipping the wire (at the end away from the lead-in, of course) and inserting an insulator. Then try a roof of 30 ft., 20 ft., and perhaps 10 ft. As a result of your experiments you will discover which is most suitable for your requirements. You can then shorten the original stranded wire as required and put it up again.

Shinton's Television System Details

A few more details appear to be available concerning the television apparatus which is being developed by J. S. Shinton, of Wolverhampton, and about which I spoke in these columns a few weeks ago. First of all, in the transmitter itself the images of the subject being televised are intermittently reflected on to a selector device comprising a stationary slot and a rotating slotted disc. This is brought about by the image being projected through the medium of a lens on to the edge of a rotating wheel having a number of mirrors arranged tangential to the rim and parallel to the axis of rotation. In effect, of course, this is really the Weiller drum, which forms such an integral part of the Karolus system of television.

As the wheel rotates each mirror reflects and focuses the image on a disc rotating about an axis perpendicular to that of the wheel and provided with radial or other slots overlapping a slot in a fixed member. It is here that we see the similarity to the original Baird apparatus when the flood-lighting scheme was being demonstrated before his spotlight method had come to the fore. The light-sensitive cell is mounted behind the fixed member, and it is stated that the wheel may revolve at 2,000 revolutions per minute. As for the disc, this may have five slots and revolve at 60 revolutions per minute. So much, then, for the transmitter; and what do we find at the receiving end?

The Television Receiver

Here we meet a rather complicated arrangement where the light from a source passes through a lens, a polarising Nicol, a Kerr cell, an analysing Nicol and lens, and finally on to a wheel similar to that employed at the transmitter. The output of the photo-electric cell is actually applied to the plates of the Kerr cell. The modulated light signals are reflected by a number of tangentially arranged mirrors on one wheel on to further mirrors placed round the edge of a second wheel, and from here they pass finally to the receiving screen. The second wheel rotates at ten revolutions per second about an axis perpendicular to the first wheel and may have thirty mirrors. So far the scheme makes

no claims in the direction of synchronising, and undoubtedly the apparatus will be simplified at some future date.

Television Programmes

Having an opportunity to "look in" at one of the morning experimental transmissions by the Baird process, I was rewarded by quite an interesting programme. Various types of head-dress, both male and female, were being tried out, and the details came through remarkably well. Various periods were illustrated, and although certain of the colours seemed unreal when viewed on the television screen, owing to the particular type of photo-electric cells then in use, the transmission as a whole was extremely good. A few sleight-of-hand tricks with cards and black and white sketches, together with printed messages, all lent variety and savoured of a portion of a vaudeville programme.

Look to Your Sets

Modern radio circuits are not the be-all and end-all of super-quality, super-selective reception. No amount of care in the original selection of components, their arrangement, push-pulling the L.F. valves or high H.T. will compensate for the poor operation and maintenance of a set. I am thinking particularly of the application of the right voltages, filament, plate and grid, and the maintenance of those voltages at the right figure. When the H.T. batteries are running down, but still usable, adjustments will have to be made from time to time if the best result is to be obtained. The faults which are likely to creep into radio reception in this way are like the growth of a small child; not noticeable to those who live with it all the time, but startlingly noticeable to visitors! These are the faults which probably creep into the talking-picture apparatus at your local cinema, and which are noticed by you because you visit the place only occasionally and not every night.

Falling H.T.

When the H.T. runs down, less grid bias will be needed. And when you change the last valve for one of later design, probably having a lower impedance, the grid bias will have to go up. It is the ever-so-slightly falling voltage of the dry H.T. batteries which is my chief objection to them. From the economic point of view, they are very good, especially if large and high-capacity batteries are used. Small H.T. batteries should be avoided, except in the case of one-valve sets and portable receivers, where bulk and weight are important considerations.

Mutual Conductance

Valves designed for power amplification are tending to have a lower and lower

internal impedance, and at the same time as achieving this low impedance the manufacturers have succeeded in keeping up the amplification factors of the valves. The magnification factor and the impedance have definite relations one to the other; a small-mesh grid in a valve means usually that both impedance and magnification factor will be high. In the case of the power valve, the great object is to have the valve impedance as low as possible and, at the same time, have the magnification factor reasonably high. The actual "goodness factor" or "horse-power" of a valve is known as the "mutual conductance," and is obtained by dividing the magnification factor by the impedance and multiplying by a thousand. This gives a result for the modern power valve of 1.5, 2, 3, or thereabouts, as the case may be.

Grid Bias

With this ever-lowering impedance of the power valve the H.T. current has naturally increased by leaps and bounds. Nowadays a feed of 25 milliamps to the plate of the last valve is quite normal, while some super-power gourmets have rows of valves in parallel and placidly watch the milliammeter needle register 75 or 100 milliamps. The H.T. feed to a valve is, of course, governed by the amount of negative bias on the grid, and the tendency of careful radio men is to have as much negative bias on that last valve as possible, consistent with good quality. There is a great deal to be said for this method, but one must not lose sight of the fact that for the least distortion the valve should be operated on the straightest part of its anode-volts grid-bias curve. This really means that the grid bias should be of a voltage only just sufficient to prevent a flow of grid current on loud signals. This seems to me to be a strong argument in favour of the more general use of a galvanometer in the grid circuit of the last valve, the needle of which will kick as an indication of grid current.

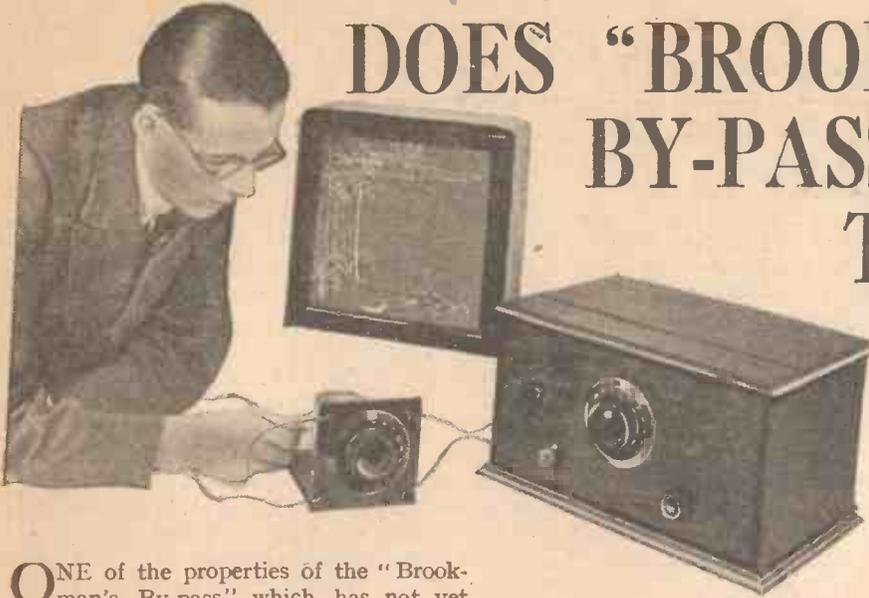
Watching the Meters

There are quite a number of methods of estimating the amount of grid bias to be applied to a valve. Some years ago Captain H. J. Round explained to me a simple method which he had found to be effective. He divided the value of the applied H.T. voltage by twice the magnification factor, and the resultant figure was the amount of negative bias. Manufacturers include details of the valve's characteristics in the boxes, including curves, which are quite reliable in these days of uniform manufacture and testing. These, however, do not take into account resistances or impedances external to the valve in the plate circuit.

THERMION.

DOES "BROOKMAN'S BY-PASS" AFFECT THE TUNING ?

By J. H. REYNER, B.Sc., A.M.I.E.E.



ONE of the properties of the "Brookman's By-pass" which has not yet been discussed is the effect which it may have upon the tuning of the receiver. Strictly speaking, a wave-trap or by-pass arrangement should not affect the tuning to any appreciable extent, and, in view of the many other desirable properties of the "Brookman's By-pass," it will be as well to investigate this question.

The effect of an interference-eliminating circuit upon the receiver itself may be of two kinds. The receiver, for example, may normally tune in to 5GB at a particular reading of the dial, whereas after the device has been connected, up the tuning may be several degrees different. While it is, of course, desirable from an ideal point of view that this shall not be the case, an alteration of a few degrees only is permis-

ated the interference, but merely shifted the scene of operations. It is not suggested that this effect is always obtained with a rejector type of trap, but it is cited as an example of interference with the tuning which may result from the use of devices of this kind.

The "Brookman's By-pass" is a most effective interference eliminator. Full details were given in Nos. 399 and 400

The "Brookman's By-pass" is quite free from this second form of interference. The interfering station may be tuned out quite sharply, and it will not be found in other positions on the dial. One or two of my friends who tested the gadget on the Brookmans Park transmissions certainly did tell me that if the by-pass was tuned to the 261-metre transmission this programme was cut clean out, only to be found again around the usual setting for 5GB. Further investigation, however, showed that they had been conducting the test during one of the special programme nights, on which 5GB and the London regional transmitter were taking the same programme! The effect, therefore, proved to be a false alarm.

A Small Alteration Inevitable

When we consider the possible effect which the "Brookman's By-pass" may have on the tuning of one receiver, however, it is clear that a small alteration must necessarily result. We have already seen that the impedance of the "Brookman's By-pass" at the tuning point is that of a very small resistance, acting as a short-circuit across our receiver. At frequencies other than that to which the by-pass is tuned, however, the arrangement behaves either as an inductance or as a capacity. On wavelengths below the tuning point the effect will be inductive, while above the tuning point the effect will be that of a small capacity.

Consequently, the settings on one's receiver below $2LQ$ (or whatever the interfering station on which the by-pass is being used), will be slightly increased, because we have an inductance, in parallel with the tuning inductance. On settings above $2LQ$ the dial reading will be reduced somewhat, because the aerial capacity has been increased to a greater or less extent.

In the majority of circuits the variation is small, because the aerial is not usually connected across the whole tuned circuit. Either a coupled or auto-tapped system is employed, as a rule, or the aerial is coupled through a .0001 condenser, which has much the same effect.

As long as we are using a circuit of this type, a considerable alteration to the aerial capacity will only have a small effect on the tuning. For example, with a coupled aerial circuit a capacity of as much as .0005 microfarad connected across a tap one-sixth of the way up the coil would be equivalent to $1/36$ th of this amount connected across the whole coil, i.e., only 14 micro-microfarad.

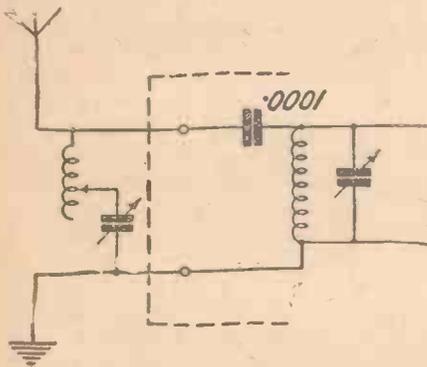


Fig. 1. Always connect the "Brookman's By-pass" on the aerial side of a series condenser, if you use one

sible and involves no extra difficulty in tuning the receiver. On the other hand, a variation of ten or twenty degrees would be impracticable, for it would alter the tuning simply beyond recognition.

The second effect, often experienced with the rejector type of trap, is that, although the particular interfering station can be eliminated satisfactorily at its normal tuning position, it will be found to be receivable at some other point, perhaps twenty or thirty degrees away.

The rejector, therefore, has, not elimin-

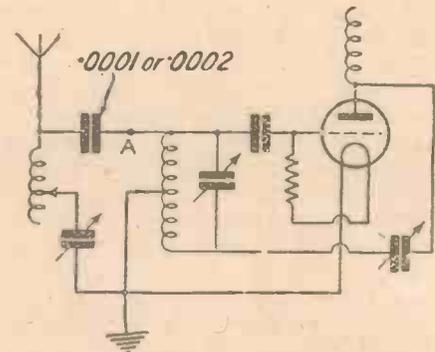


Fig. 2. If your aerial is connected across a large part of the coil, as in the Hartley circuit shown here, insert a condenser as shown and connect the by-pass on the aerial side of this condenser

In the case of the "Brookman's By-pass" the effect is to increase the aerial capacity by an amount which on wavelengths distinctly above the by-passing point, is practically equal to the capacity of the by-pass condenser itself. Even on the lowest tap (40 turns), where a large capacity is necessary for tuning, we only increase the aerial capacity by a value of something less than around .0003 mfd and,

(Continued at foot of next page)

For the Newcomer to Wireless: THE AERIAL PROBLEM

I AM thinking of raising and lengthening my aerial, but I would like your advice first.

Well, my advice is just that of Mr. Punch to those about to marry.

What? You don't believe in the long, high aerial?

Certainly not nowadays.

Why, please?

Well, the real trouble to-day is not how to tune in stations, but how to tune them out.

Please explain.

Both our home stations and a great number of those on the Continent have carried out or are contemplating increases in their power. That means that with an ordinary aerial they are received at pretty good strength.

I quite agree.

But these increases in power mean a bigger wipe-out effect, and since wavelengths are now very close together we must have selectivity if we are going to be able to receive a respectable number of stations. This is particularly important where one is fairly close to a high-power station.

But I have heard it said that a high aerial with a good roof is at least "half

a valve" better than a low, short one.

It may certainly provide rather stronger signals with a given set, but you will find that you receive a much smaller number of stations owing to the decrease in selectivity, and you will receive other things, too.

How do you mean?

I mean that you get more than you need have of atmospherics, spark signals, and possibly local interference caused by flashing signs, tram-cars, electric railways, and so on.

Then you're all against what used to be known as a good aerial?

On the whole, I am. When high-frequency amplification of an efficient kind was difficult and expensive to obtain one had to get all that one could from the aerial. But nowadays, when it is a comparatively simple business to obtain enormous high-frequency magnification, I am all in favour of smaller aerials and more H.F.

Don't you use an outdoor wire?

Hardly ever nowadays, for I find that I can get everything I want without half as much interference with either a frame or a simple indoor aerial consisting of a wire suspended round three sides

of a room about a foot below the ceiling.

I have certainly not been quite satisfied with my selectivity even with the old aerial. What would you advise me to do?

I should certainly say reduce the roof portion. Increase the height of it, if you like, but don't go in for length. Honestly, though, I think that you will be better advised to spend your time and your money on improving the H.F. part of your set, for first-rate high-frequency amplification is the key to success as things are at present.

As a matter of fact, I did try an indoor aerial last week, but I didn't find it frightfully successful. It wasn't much more selective than the outdoor wire.

I expect that you had the outdoor wire up whilst you were testing out the indoor collector.

Why, of course I did.

So long as the outdoor aerial is there you won't find that you get the best results from the indoor, especially if the latter is in a room on the same side of the house as the former. Make your tests again, but lower the outdoor aerial right down before you do so.

"DOES BROOKMAN'S BY-PASS AFFECT THE TUNING?"

(Continued from preceding page)

as we have just seen, this will only have a small effect, provided one is using a coupled or tapped aerial.

The case of the aerial which is coupled through a small condenser is even more favourable. It is customary to employ a value of about .0001 microfarad or less for the series condenser. The effective capacity across the tuning circuit is then the resultant capacity made up of the aerial capacity and the .0001 condenser in series. Let us assume that the aerial capacity is .00025 microfarad but that this value has been increased by connecting a "Brookman's By-pass" across aerial and earth as in Fig. 1. We will again assume that we have increased the capacity by as much as .0005 microfarad so that the total capacity now becomes .00075.

The resultant capacity of this and .0001 series condenser is now .00083 microfarad. It will be seen that the effective capacity has only increased by .00011 microfarad, which is very small, probably only one degree at the top of the scale.

On the Long Wavelengths

This change in the dial setting is most likely to occur on the long wavelengths. In many cases it will not be troublesome on the short waves, but on the long waves it

will be more noticeable. With the circuits just described the trouble will not be serious, but if it proves at all annoying the wave-

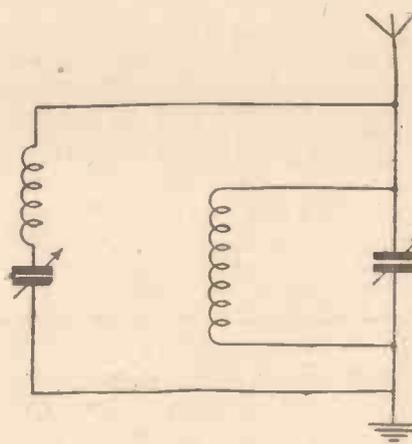


Fig. 3. If the aerial is connected across the whole coil, the Brookman's By-pass will affect the tuning

trap should temporarily be disconnected. This is done by taking the crocodile clip off the coil, thus breaking the by-pass

circuit. Alternatively, a switch may be incorporated to do the same thing.

Where the aerial is connected across an appreciable part of the coil, as for example with a Hartley circuit, this alteration to the tune may be very marked. To overcome the defect, the best method of operation is to remove the aerial capacity from the circuit in some suitable way. The aerial, for example, may be connected through a .0002 condenser instead of directly across the circuit. This will not seriously affect the strength, but it will reduce the aerial capacity. If the by-pass is then connected on the aerial side of this condenser, as shown in Fig. 2, we have a somewhat similar condition of affairs to that already discussed with the .0001 condenser, and the alteration of tune will be minimised. Note, by the way, that the insertion of the .0002 condenser will in itself alter the tune to some extent, apart from the effect of the by-pass, but the difference in the tuning with the by-pass in or out will only be small if this precaution is adopted.

Radio advertising is comparatively cheap in the United States, over the network (twenty-three stations) of the National Broadcasting Co. Any half-hour after 6 p.m. costs £650, with an additional £300 for entertainment. The total cost for reaching an estimated audience of 8,000,000 people is little more than one half the cost of a full page in the *Saturday Evening Post*.

NEXT WEEK:

**FURTHER DETAILS
OF
"EVERYBODY'S ALL - ELECTRIC 3"**



Our cartoonist's idea of Sydney Moseley



**OLD MUSICAL COMEDY :: A GOOD VAUDEVILLE :: POLITICAL BIAS
TWO WEIRD DRAMAS :: THE SYMPHONY CONCERTS**

THOSE clergymen who desire to know the sort of talk that gets over in the home should get a copy—if possible—of what Canon W. H. Elliott had to say on "Home and Friendship." It is surprising, with all the worldliness of the present generation, what a number of people like these homely, sentimental talks. They don't often make themselves heard, but, as I have always insisted, the bulk of Britfishers have no use for the "high spots" of the small but noisy world of so-called Modernists.

Canon Elliott was helped by the excellent studio choir.

Tip to Isolde Menges: Your photograph does not do you justice.

It was about two years ago that I suggested in these columns that some of the old musical comedies would well stand repetition. This was proved by the hour's programme in which Lilian Keyes and George Pizzev took part. What volume Pizzev has! A whole library, in fact. Then the Leslie Stuart programme was a big success, and I think might well be repeated at an early date.

I wonder what the jazz fiends think of those homely, melodious tunes of the Victorian and Edwardian days?

I am afraid the debates are not always of a high standard. That between Dr. J. C. Flugel and Mr. Anthony Bradley was hardly good enough. Mr. Bradley had no case and contented himself at first by such profound interjections as: "I don't agree with you."

I suppose, having had Mr. Bradley (who, I take it, is the worthy son of an enterprising sire in the tailoring, spiritualistic, and literary worlds), other firms will ask that *their* sons be permitted to talk about *their* wares.

Tommy Handley's introduction to the sketch *The Pot Boiler* was really witty, but when suddenly Jean Allistone came in with one of those sickly, sentimental ditties, the marks which I wished to award the sketch were quickly erased. Something about "Why can't I be with yew—blew—trew——" Amazing originality!

In the same programme—which, by the way, I call a really decent vaudeville hour—was Harry Hemsley, who achieves big successes with impersonations of *one* child. When, however, he strives to make this one child into another the effect is not so striking, for it is the one child all the time.

The French Ambassador showed how the introductory speech of the national programme should be given. It was ideally brief and to the point.

The opening of the programme, however, sounded far too like a debate. There was not enough music by what was an excellent orchestra.

Wish Wynne is *not* successful in her Cockney representations of fairy stories.

I am not a Conservative. If I were, I should certainly object to the political bias of Mr. Nicolson in his talk the other evening. Mr. Nicolson, like certain other journalists, will make a hit if he is permitted to say what other people wish to say, but have not an opportunity of saying.

I switched off very soon after the well-known Madame Suggia began to play. Her unaccompanied Bach was a bit too much for me. It certainly sounded almost as impossible as much of that strange concert given by modern composers the other night at the Central Hall, Westminster.

These modern concerts, by the way, are becoming a laughing stock in London. Something ought to be done about it.

Ernest Butcher and Muriel George provided the only item relayed from the Palladium that was worth while. They sang clean, clever, and diverting songs. But, then, I regard Ernest and Muriel as a B.B.C. turn.

Who was the gentleman who found it was necessary to announce the items at the Wagner concert relayed from Bristol? Was he accustomed to presiding at parish hall concerts?

The "Day's Work" series continues to be interesting. There is nothing like hearing how the other fellow does his job, and Mr. E. Eldridge gave an interesting account of his day's work as a keeper in the lion house at the Zoo. I don't know whether we have had the story about the serpents. That ought to be as fascinating as their fangs.

I didn't at all like *Witch Wife*, a drama by Michael Hogan and Mabel Constanduros. It was harrowing and most un-Saturday-night like. Certainly one does not expect this sort of thing from Mabel C., who rather likes to make us laugh than freeze our blood.

The whimpering heroine certainly got on my nerves, and I deserve a putty medal for having continued to listen-in. Why do funny people nurture ambitions to be tragic? It is indeed an artistic tragedy.

In the same programme, *The Crossing*, by Holt Marvel and Cyril Lister, was given again. The effects were not quite so good as they were in London. It is quite the sort of play for broadcasting, but, like *Witch Wife*, has an uncanny theme. Those who were responsible for putting on these two plays the same evening should realise that there is such a thing as contrast.

I have been to one or two symphony concerts lately. There is always a fair audience at the Queen's Hall, but there is no doubt you must be a musician in order to appreciate the good things that are offered; by which I mean I enjoy some of the big things, but *not* the experiments.

Mr. Victor Hely-Hutchinson is a conscientious musician, but he should show a little more swank.

I shall deal with my interesting correspondence in due course.



My Wireless Den

Weekly Tips—Constructional and Theoretical—
by W. JAMES

My Big Set

IN the issue of February 8 I asked those readers who felt keen on building a really powerful receiver having about five valves to write me.

I have had a large number of letters and as I cannot reply separately to each writer I want to thank them all here for their kind remarks and encouragement.

Having carefully noted the contents and various ideas sent in, I am putting together the first experimental model. In a week or two the set will be ready and will, I am sure, set a new standard in regard to selectivity and quality of reproduction. There are one or two new ideas in the set. Selectivity is obtained without side-band cutting and many stations are heard in the daytime without reaction.

Eliminator Output

Those who use a mains unit having a metal rectifier may have noticed that the full output is not obtained when it is first switched on. Actually, the output increases for a few minutes and then settles down to normal when the temperature of the parts has reached the usual working value.

The effect depends to an extent upon the size of the rectifier and its loading, and does not affect the reproduction as a rule. But if instruments are used to measure the output the fact that the output slowly rises to its full value can easily be seen. It is important that adequate ventilation be provided for the rectifier, which must, therefore, not be enclosed in too confined a space. Used with proper cooling, considerably increased outputs may be obtained. Oil cooling could be tried with satisfactory results.

Sheer Carelessness!

I have often wondered why so many small but important components are spoiled by lack of attention to details. In front of me at the moment I have a 4-microfarad fixed condenser fitted with terminals. When screwed down, the threaded screw is not much more than half-way up the terminal.

Further, the under part of the terminal is counter-sunk, with the result that only about one-third of the threads are actually being used. When a wire, or perhaps two or three, are fitted to the terminal only a few threads will be engaged. The joint will be a poor one, all because the manu-

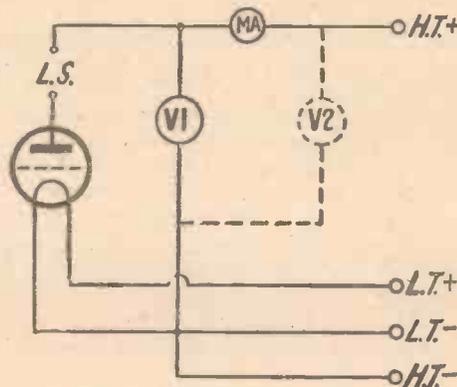
facturer has failed to provide screwed parts of adequate length.

Another point is that the heads of the terminals are round. Pliers will therefore probably damage them. Obviously, they should have hexagonal heads, in order that pliers may be used for tightening. Many parts have minor defects of this description.

Voltmeter Position

A small point, but an important one, arises in connection with the position of a voltmeter in a set as indicated in the accompanying figure.

We have here a milliammeter joined in the high-tension feed to the last valve and a voltmeter for showing the voltage. Now, the voltmeter can be connected as at v1



Two voltmeter positions, the relative advantages of which are discussed in the accompanying paragraph

or v2; it will indicate the true voltage in both positions, as the drop across the milliammeter is negligible. But if it is joined at v1 the milliammeter will show the current passed by the voltmeter as well as the valve. As the usual type passes, say, 10 milliamperes, the milliammeter may easily be damaged.

Do not, therefore, connect the voltmeter as at v1, but as at v2, for then the milliammeter will show the true current. The voltmeter may, as a matter of fact, so load the supply that its voltage falls, but this does not affect the principle outlined above.

A Cure That Isn't

The trick of reversing the connections to the primary or secondary winding of a low-frequency transformer in order to remove a howl or squeal is well known. What is

not so well known, however, is that the fault is not removed by doing this.

The real cause of the squeal may be lack of by-pass condensers or other filtering and a high-resistance power unit or dry battery. By reversing the connections to one of the windings a regenerative effect may be converted into a de-generative effect, with the result that the response curve of the amplifier has a dip in it.

It is better to fit a choke-capacity output circuit when there is not one in the set. This will usually help matters by keeping the greater part of the low-frequency currents out of the high-tension supply.

G.B. in Reverse!

Talking with a man the other day who has hundreds of sets passing through his hands, I was surprised to hear that a common fault is a reversed grid-bias battery, the battery being wrongly marked.

I have mentioned this fault on several occasions, as my own experience has taught me that the fault is by no means uncommon. But I was rather surprised to hear of the percentage of reversed grid batteries. Most people would, of course, detect at once that something was wrong after switching on, but those who first looked elsewhere in the circuit might eventually discover that the power valve has lost its emission and the high-tension battery is down.

The best plan is to have a grid battery tested when it is purchased, not with a flash-lamp bulb, as I have seen at various times, but with a moving-coil voltmeter.

"Noisy" Resistances

The adjustable resistances fitted to many mains units or in the shield circuit of a shielded valve are generally of the compression type. Occasionally a faulty specimen is issued, and by varying in resistance intermittently, produces noisy reception.

This may not be noticed when a large by-pass condenser is fitted, but, by varying the actual voltage of the part of the circuit to which it is connected, may spoil the results. Its resistance may, for example, gradually increase. This would reduce the voltage applied to the circuit.

A "noisy" resistance is a nuisance and the best plan is to discard it at once. The makers will usually replace a faulty component, provided, of course, that it has not been overloaded.

Translating an Americanism, "selling time" means leasing the ether, through a chain of broadcasting stations, to an advertising interest. Is there any economic necessity for the B.B.C. to do this, or any political reason why they should not? These are questions Alan S. Hunter attempts to answer below.

THE B.B.C. needs more money. We can, I think, safely assume that the present mediocrity of some of the programmes is due to lack of sufficient revenue and not to any lack of vision on the part of the programme compilers.

Some of the world's greatest artistes, demanding well-merited but fabulous fees, are never heard by B.B.C. listeners because the B.B.C. cannot afford them. The need for more money to improve the programmes is a strong argument in favour of the B.B.C. selling time and thereby augmenting their present means of revenue.

The B.B.C.'s attitude towards this question of additional revenue is well known. It has repeatedly asked why the Post Office should retain such a disproportionate percentage of the licence revenue. Even if this is regarded as an entertainment tax, the amount of money lost to the B.B.C. is unduly great.

It is of little use asking the B.B.C. to express an opinion on the desirability of selling time. By its royal charter the B.B.C. is prohibited from accepting payment for broadcast programmes. Naturally, the officials must act in accordance with the charter until it comes up for revision in seven years' time or is, in the meantime, altered by Act of Parliament.



The studio of Radio Paris from which various advertising programmes are broadcast to British listeners

Should the B.B.C. Sell Time?

It is interesting to note that Sir John Reith, Director-General of the B.B.C., has expressed the opinion that selling time by the B.B.C. is neither necessary nor desirable.

A French Example

It is conceivable that B.B.C. listeners, who pay ten shillings a year to be provided with programmes, might resent the introduction of advertisers' programmes. There might well be a feeling that listeners were paying twice over for their broadcasting programmes. But many who subscribe annually for a receiving licence avail themselves of broadcast programmes from the Continent. For the upkeep of these foreign stations they pay nothing, Radio Paris, the long-wave French station, is almost as easily and as regularly received in this country, especially in the south, as Daven-try 5XX.

It is from this Continental station that British listeners can now test their feelings with regard to advertised programmes. Radio Paris makes a habit of selling time. There is an organisation in London, known as Radio Publicity, Limited, which arranges hours of light entertainment for several British firms. These are broadcast on Sundays from Radio Paris and are undoubtedly tuned in by thousands of British listeners. A well-known London hotel, a gramophone-recording company, and a suit-case manufacturer are working on American broadcast advertising lines through Radio Publicity, Limited. British listeners have an excellent opportunity to see whether they are irritated by the interpolation of advertising "puffs" during these hours of light entertainment.

No Irritation

As to some listeners in this country the

B.B.C.'s programmes are of negligible interest, it is not surprising that they turn with relief to the lighter fare provided by these advertising interests through the medium of Radio Paris.

Such opinions as I have been able to canvass among my listening friends go to show that the rigmarole of the advertiser's announcements amuses them instead of irritating them. I find the chatty remarks during these sponsored hours more entertaining than the rigid formality of the B.B.C.'s official programmes. The announcements are, by the way, given out by an English announcer at Radio Paris.

Provided that it is done in the best American style, there is no irritation to the listener in advertising broadcasts. On the contrary, the dry-as-dust formality of our excellent B.B.C. announcers is pleasantly mellowed. On my return from America last summer, I made the point in *AMATEUR WIRELESS* that the mode of presentation practised

by American announcers seemed to me, as a listener, to be preferable to our own formality. Advertising broadcasts are always conducted in a friendly way.

B.B.C. Apathy

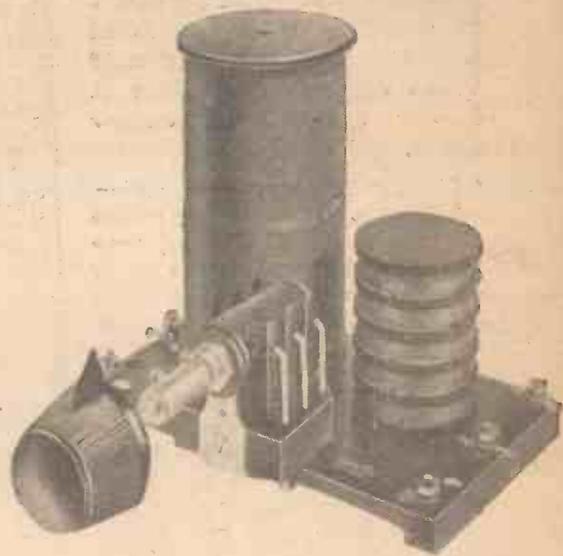
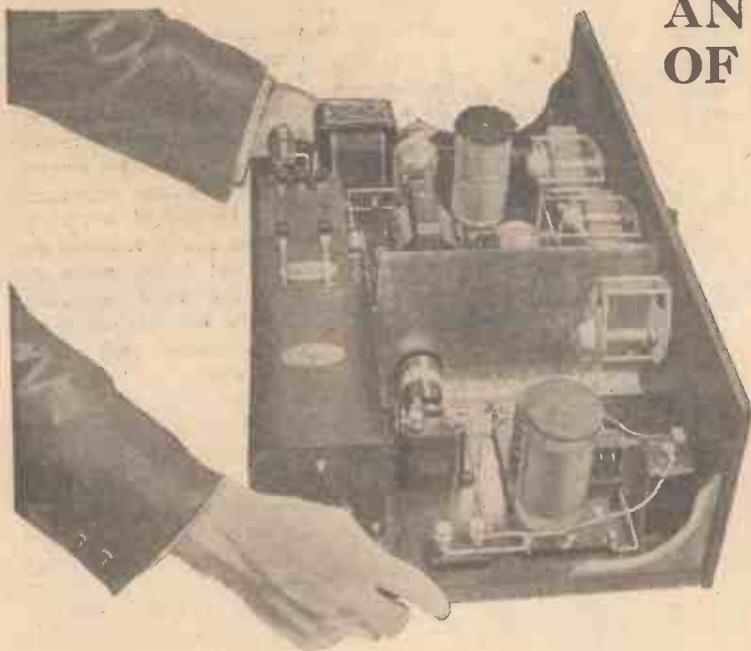
Although there is a general apathy towards selling time by the B.B.C., so far as the advertiser is concerned, there is little doubt that, given the facilities, there would be no difficulty in selling whatever time was available. According to an official of Radio Publicity, Limited, several of our big national advertisers would be participating in the Radio Paris broadcasts were it not for an advertising ban placed upon them. It appears that an influential newspaper body, fearing the competition of radio advertising, has prohibited newspapers from carrying advertisements of firms drawing attention to their advertising broadcasts.

The Greatest Difficulty

If we may take American broadcasting as an example, it is clear that radio advertising and newspaper advertising are essentially complementary. In America, many firms who have increased production by radio advertising have been able to spend more money on space advertising.

I must confess that the possibility of the B.B.C. ever selling time becomes more remote as one investigates the many opposing and conflicting interests involved. Apart from the B.B.C., there is no organisation connected with radio strong enough to influence the trend and development of British broadcasting. There is no link between the commercial interests of radio and the broadcasting organisation itself. This seems to me to be the biggest stumbling block to the introduction of advertised programmes by the B.B.C.

AN ALL-ELECTRIC VERSION OF A FAMOUS JAMES SET



THE advantages of an all-electric set as compared with a battery-operated one are numerous and substantial.

In the first place, the 4-volt mains valves, of the indirectly-heated type, are, on the whole, superior to battery valves of similar classification. Their amplification factors in comparison with their impedances are greater and their general characteristics are better. As a direct consequence, greater magnification can be obtained merely by putting mains valves into a set in place of the battery valves, making suitable changes to the filament circuit, of course.

Alternatively, adjustments may be made which will result in better quality being obtained, or, on the other hand, greater power may be dealt with for an equal

Everybody's

amount of amplification before the last stage.

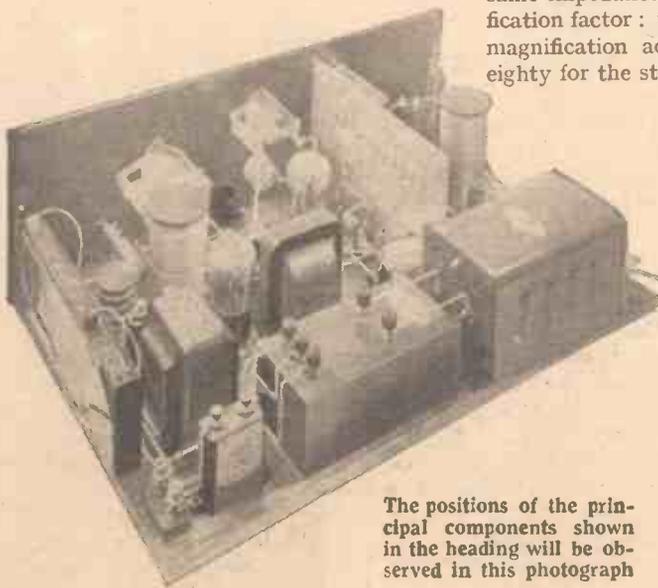
Let us take the shielded valve stage as an example. With a given 1930 Binowave coil, without reaction, the pure high-frequency amplification of the stage connected to the detector is about forty. This is when using a battery valve of 200,000 ohms having a magnification factor of 200. A mains valve of the same make has, for the same impedance, exactly twice the amplification factor: that is, 400. Therefore, the magnification actually obtained is about eighty for the stage.

With a different make of shielded valve having not such a good "slope," the actual magnification may be no better than when a battery valve is used. But in this instance it is possible to secure more magnification by taking advantage of the fact that the anode-grid capacity of the mains valve is less than that of ordinary battery types. This means that more magnification can be obtained without the grid circuit being set into oscillation. A larger primary

winding may, therefore, be used, and the extra magnification obtained.

The selectivity will probably not suffer by doing this, for the reason that the mains valves being discussed have really high impedances of from 500,000 ohms to over 1 megohm.

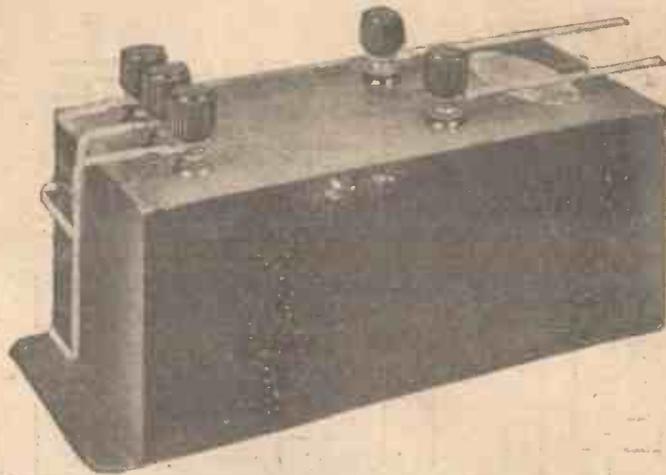
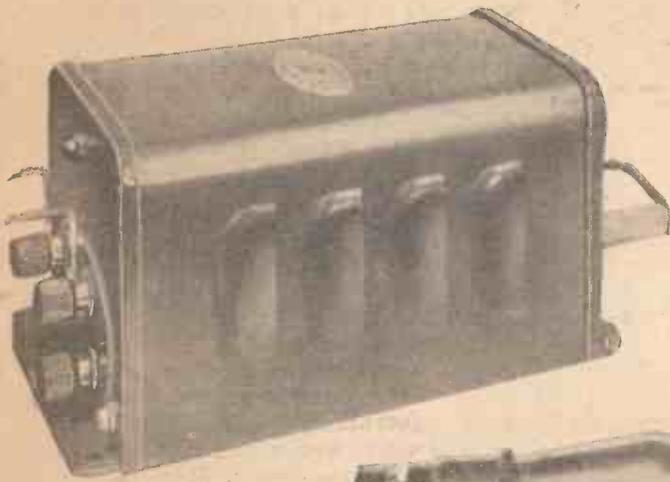
In order to take full advantage of these points, it is clearly essential to provide a suitable tapped primary winding. Experience shows that only the medium-wave primary coil of the 1930 Binowave coils need be tapped. I have, therefore, provided a tapped medium-wave primary coil and left the long-wave coils alone.



The positions of the principal components shown in the heading will be observed in this photograph

LIST OF COMPONENTS

- Ebonite or bakelite panel, 21 in. by 7 in. (Frolix, Camco, Lissen, Raymond, Trelleborg).
- Two .0005-mfd. variable condensers, with slow-motion movement (Polar "Ideal," J. B., Lissen, Dubilier, Ormond, Igranic, Lotus, Burton).
- .0025-mfd. reaction condenser (Polar, type Q.J.; Lotus, Bulgin).
- Variable resistance, 100 ohms to 5 megohms (Clarostat "Standard," Volustat, Regenstat).
- Pair of Brookmans coils, aerial and anode (Wearite).
- Upright 5-pin A.C. valve holder (W.B., Lotus, Junit).
- Flat 5-pin A.C. valve holder (W.B., Lotus, Junit, Wearite).
- Four-pin valve holder (Lotus, Igranic, Formo, Brownie).
- .0002-mfd. fixed condenser (upright type), with series clips (Dubilier, type 620; T.C.C., Graham-Farish, Lissen).
- .0001-mfd. fixed condenser (upright type) (Dubilier, type 620; T.C.C., Graham-Farish, Lissen).
- Low-frequency transformer (Lissen, Varley, Telsen, Ferranti, Igranic, Lewcos, Marconiphone).



All-electric 3

An Efficient Coil

Incidentally, this new coil with a tapped primary will now be the standard anode coupling coil, and should be used in such sets as "Everybody's 3." The reason for this is that shielded valves vary so greatly. Some are as low as 120,000 ohms, and others as high as 500,000 ohms. These are actual test figures that I have taken myself, the valves being of standard battery types. Obviously, no one transformer can possibly suit so wide a range of anode impedances. Therefore I have decided to introduce a tapped medium-wave primary coil in order that the best results may be

obtained from all types of valves.

Let us now look at the detector position. Here it is usual to employ a valve of 20,000 ohms, having a magnification factor of 20, or of approximately these values, or a valve of the so-called R.C. type of, say, 50,000 ohms and 35, depending upon the coupling transformer and the quality desired. These are battery valves, of course.

Suitable 4-volt mains valves have impedances of about 20,000 ohms and magnification factors of 35. These valves are obviously definitely better. Quality will be better and there will be more volume owing to the extension of the frequency range, with transformer coupling.

In the power stage we may use a mains valve of 5,000 ohms and 10, or 2,850 ohms and 10, according to the make. Two-volt battery valves of 4,000 ohms and 8 are available, however, so here the difference is, perhaps, not so marked.

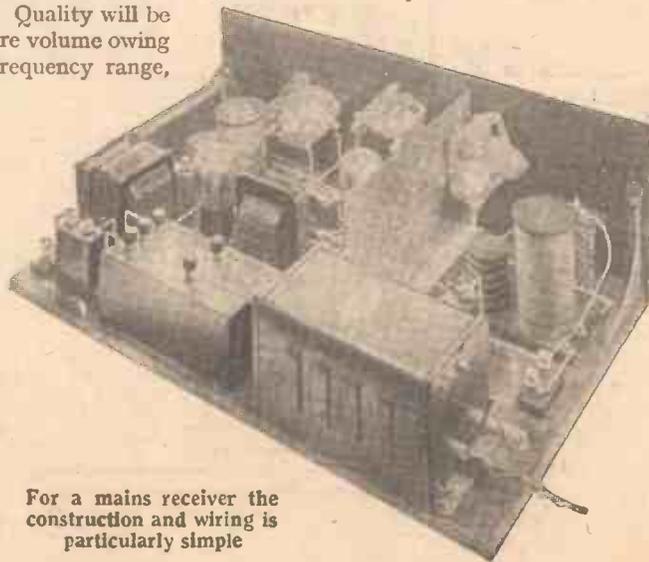
The first point, briefly then, is that better results can be obtained because of the superior characteristics of the mains valves.

The second point is an important one and is that *consistent* results are obtained. This is due to the power supply remaining steady. Thus the filaments of the valves are always supplied with their correct heating current. There is no accumulator to vary in voltage. Instead, the filaments are heated through a transformer joined to the supply mains.

No Battery Troubles

The high-tension also remains steady; if the voltage applied to the output valve is 125 when first the set is put together, for example, it remains at this voltage so long as the valves or the grid bias do not vary. The voltage of the mains supply itself does not remain quite steady as a rule, but is liable to fluctuate about the normal value, but this is usually a matter of no importance.

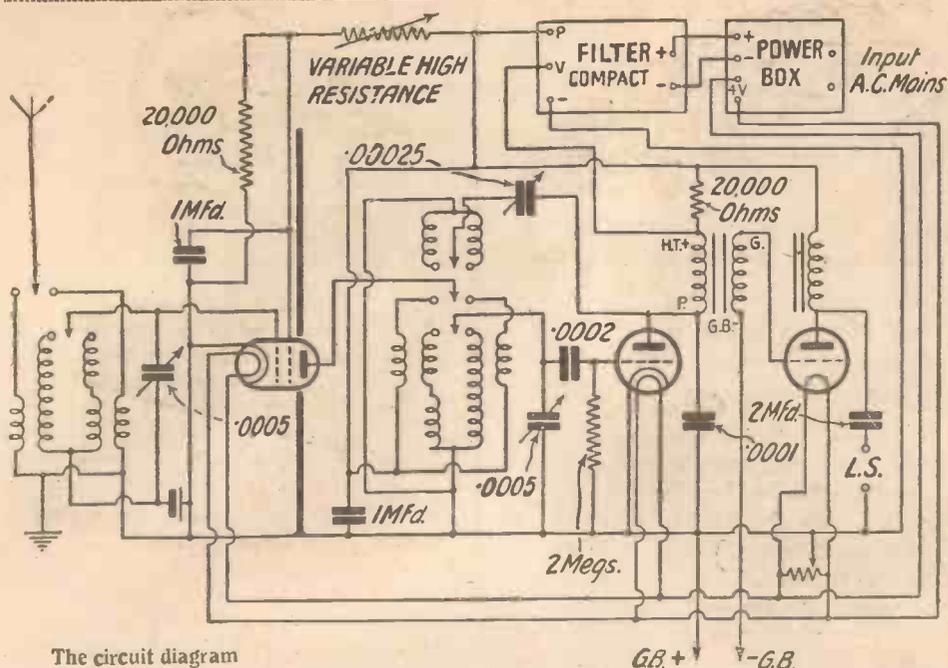
By having a consistently good supply the working of the receiver remains uniform. Selectivity does not vary, the reaction is always reliable, and the same volume can always be obtained, whereas with a battery set, as the batteries discharge, the tuning is affected, range is reduced, and less volume can be dealt with by the last valve.



For a mains receiver the construction and wiring is particularly simple

COMPONENTS

Two 20,000-ohm wire-wound resistances, with holders (Ready Radio, Lissen, Dubilier, Varley).
 Two 1-mfd. fixed condensers (Dubilier, T.C.C., Lissen, Hydra).
 2-mfd. fixed condenser (Dubilier, T.C.C., Lissen, Hydra).
 2-megohm grid leak (Dubilier, Lissen, Watmel).
 Output choke, 20 henries, 100 milliamperes (Varley, Ferranti, Igranic, Bulgin, Wearite).
 Two terminal blocks marked: Aerial and Earth, and L.S.+, L.S.— (Lissen, Junit).
 Special power box (Regentone No. 1).
 Filter Compact (Regentone No. 1).
 Screen, 9 in. by 6 in., with hole for S.G. valve (Parex, Ready Radio, Raymond).
 15-ohm baseboard - mounting potentiometer (Wearite).
 Panel brackets (Ready Radio).
 Baseboard, 21 in. by 13 in. (Picketts).
 2 yds. thin flex (Lewcoflex).
 1½-volt grid cell (Siemens, type G.T.).
 Two wander plugs, marked: G.B.+, G.B.— (Belling-Lee, Eelox, Clix).
 Connecting wire (Glazite).



The circuit diagram

G.B. + -G.B.

distinct. There is no short-circuiting or paralleling of windings; instead, the switch connects either the medium- or long-wave windings, comprising primary, grid, and reaction coils. Therefore the greatest efficiency is obtained on both wavebands, with the result that selectivity and magnification are exceptional.

Not a single case of switch failure has been brought to my notice. The coils are naturally a shilling or two dearer than some other types, but the better design is worth while.

In "Everybody's 3" a filament resistance connected to the high-frequency amplifying valve was used as a volume control. Now, we cannot employ this method when mains valves are used. Filament control of a mains valve as at present constructed is not a practical proposition. It is desirable, however, to employ a means of adjusting the amount of the high-frequency amplification. This may be effected by regulating the voltage of the shield of the valve. An

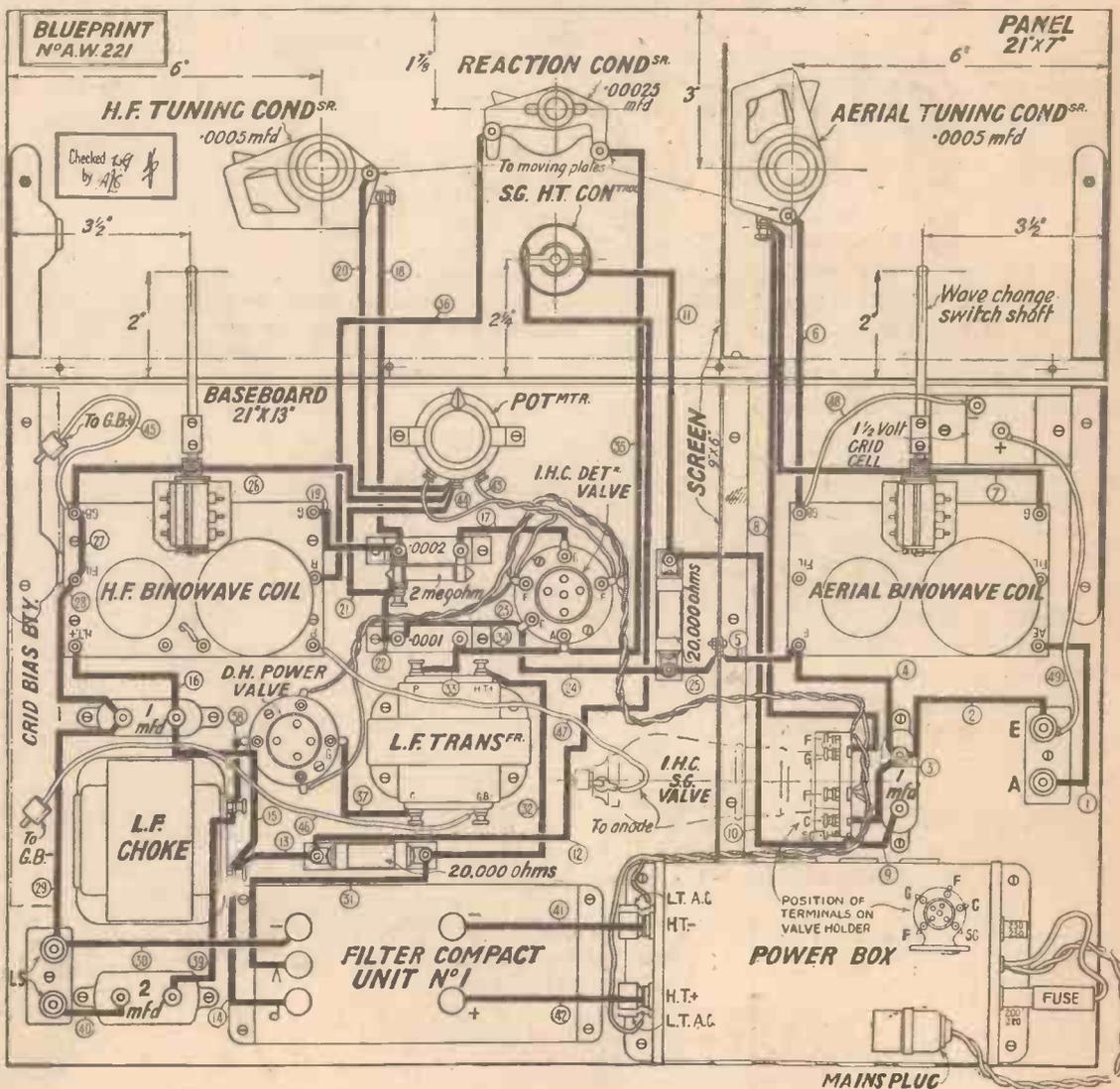
(Continued on page 309)

The receiver illustrated is fitted with a grid-bias battery in order to keep the total cost reasonable. This battery need not occasion the slightest worry, as a normal sample has a long, useful life.

When purchasing the grid battery have it tested for polarity as well as voltage, as some of them are wrongly marked.

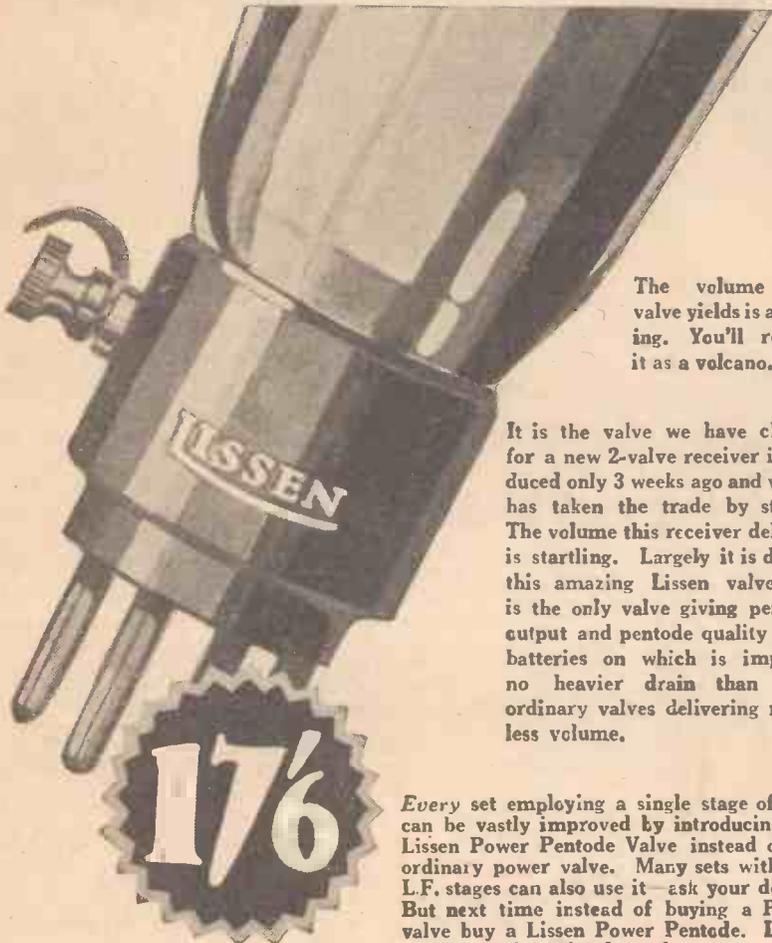
The complete receiver may be divided into two parts, first the set proper and secondly, the power supply apparatus. Readers will recognise that the set resembles "Everybody's 3," which was described some time ago. Actually the aerial coil is identical in the two sets, but owing to the fact that mains shielded valves pass grid current, even when a small negative bias is applied, the grid is biased by a 1.5-volt dry cell. Were this cell omitted, the valve would broaden the tuning of the aerial circuit.

In the anode circuit of the shielded valve is the special 1930 Binowave coil. I want to draw attention to the fact that the medium- and long-wave parts of these coils are quite



The wiring diagram of "Everybody's All-electric 3." You can obtain a full-size Blueprint, price 1/-, which will be of great assistance in the construction of the set

AN ERUPTION OF VOLUME



The volume this valve yields is amazing. You'll regard it as a volcano.

It is the valve we have chosen for a new 2-valve receiver introduced only 3 weeks ago and which has taken the trade by storm. The volume this receiver delivers is startling. Largely it is due to this amazing Lissen valve. It is the only valve giving pentode output and pentode quality from batteries on which is imposed no heavier drain than with ordinary valves delivering much less volume.

Every set employing a single stage of L.F. can be vastly improved by introducing the Lissen Power Pentode Valve instead of an ordinary power valve. Many sets with two L.F. stages can also use it—ask your dealer. But next time instead of buying a Power valve buy a Lissen Power Pentode. Listen to its eruption of volume!

LISSEN POWER PENTODE P.T.225
(Consumption only 7 milliamps) 17/6

NEW

EMPLOYS THE EXCLUSIVE LISSEN EXTENDED GRID CONSTRUCTION.

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POWER PENTODE -battery driven!

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CHEAP**

Lissen H.T. Eliminators deliver smooth, steady current from your house electric supply, and cheaply. The Lissen Eliminators can be put into your set as easily as any battery. From the four types made there will be one to suit you. Send a deposit of 5/- and we will arrange for delivery of the eliminator to suit you, and for it to be properly installed in your set. Send 5/- only. Leave the rest to us. You pay the balance in one sum after installation or by extended instalments

D.C. Model "A." 100-110 or 200-250 v. Cash Price 27/6, or 5/- down and 5 monthly payments of 5/6.

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A.C. Model "A." 100-110, 200-210, 220-230, 240-250 v. Cash Price 60/-, or 5/- down and 10 monthly payments of 6/6.

A.C. Model "B." 100-110, 200-210, 220-230, 240-250 v. Cash Price 75/-, or 5/- down and 10 monthly payments of 8/-.

LISSEN

ELIMINATORS

LISSEN, LTD.
Worple Road, Isleworth, Middlesex. Factories also at Richmond (Surrey) and Edmonton. (Managing Director : T. N. Cole.)



IF at any time you have tuned in Budapest, you must have heard the tones of the cymbalum, the National instrument of Hungary, which plays such an important rôle in all gipsy orchestras. On February 25, Constantine Vladescu will give a cymbalum recital, in the course of the vaudeville programme broadcast from 2LO and 5XX. It is not used as a piano; it has metal strings which are struck by the player with two hammers.

As a further development of their broadcasting system, the French P.T.T. authorities propose to increase the power of the Marseilles transmissions to 5 kilowatts in the aerial, and to transfer the station to a site outside the city limits. The city of Marseilles has voted an annual subsidy of roughly £250 towards the expense of special programmes.

Moscow (Russia) has now five broadcasting stations transmitting programmes throughout the day. Four of these are high-power stations, namely: Komintern (40 kilowatts) on 1,481 metres; Popoff (40 kilowatts) on 1,100 metres; the Trades Union station (C.C.S.P.S.) on 938 metres (50 kilowatts); and a 20-kilowatt experimental transmitter on 720 metres. In view of the trouble caused to Moscow

listeners, the last named is to be transferred to a site at some distance from the Soviet capital. Three 100-kilowatt stations are also under construction, one of which already installed in the neighbourhood of Leningrad, is shortly expected to start operations; the two other plants will be erected at Bogorodsk (N.E. of Moscow) and Novosibirsk in West Siberia.

Experimental transmissions from the new 8-kilowatt Lyon-la-Doua (France) broadcaster can be heard on most nights at the end of the day's programme. In most instances they consist of gramophone records, but no call is given out. The wavelength is 466 metres.

The San Sebastian broadcasting station, which had closed down for its annual spring cleaning from December 19 to January 24, has resumed its transmissions on a new wavelength. The station will be found working on 443 metres, slightly above Rome. Broadcasts are carried out on alternate days between 7 and 9 p.m., and 10 p.m., and 12.30 a.m., usually closing down with a carillon of bells. At present, in Spain there are only five stations on the air, namely: Madrid (EAJ7), Barcelona (EAJ1), Radio Catalana (EAJ13), San Sebastian (EAJ8), and Seville (EAJ5).

According to an Austrian report, the theatres in Vienna have been suffering severe losses and are seeking an annual subsidy from the broadcasting authorities. In exchange for this favour, the Ravag would be allowed to "tap" performances at will, and specially reduced prices would be granted to holders of wireless receiving licences. It is pointed out that the broadcasting authorities could cover their extra expenses by a slight increase in the cost of the listening tax.

Do you remember Mrs. Pankhurst, the leader of the suffragettes and the Votes for Women campaign? A memorial to her memory is to be unveiled on March 6 in Victoria Gardens, adjoining the Houses of Parliament. Speeches by Mr. Baldwin and Mrs. Drummond, are to be relayed through London and other transmitters. On the same evening listeners will also hear an adaptation of Cutcliffe-Hyne's "The Flying Pan," a Captain Kettle adventure, presented under the title of *Salving à Derelict*.

Elena Gerhardt, one of Germany's foremost *lieder* singers, will feature in the London programme on February 23.

February 22 has been earmarked for an evening of sheer lighthearted entertainment. The early part of the programme will include variety turns by Stainless Stephen, Dorothy McBlain, Ernest Sefton, and Betty Le Brock, Brian Hilditch, Fairchild and Lindholm, a relay from the Palladium, and excerpts from Gilbert and Sullivan's comic opera *Iolanthe* as performed at the Savoy Theatre.

An interesting talk in the "My Day's Work" series should be that given on March 8, by Mr. A. Pearn, the keeper of the Eddystone Lighthouse.

MR. FLEX MAY HANDLE A "STATION GETTER"—



—BUT HE CAN'T ARGUE WITH "THIS ONE."



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GENERAL PURPOSE AND POWER

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SUPER POWER 7'6
SCREENED GRID 15'6
PENTODE 18'6



Compare their price—test their performance. They're cheaper and better valves. Economical, too! Try them!

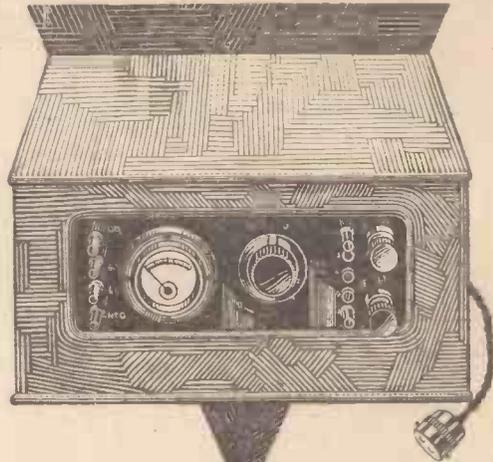
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ACCEPT NO OTHER

—for FOTOS Valves. Put them in your set—and note the difference! A valve masterpiece at a popular price—that's FOTOS! Send for your copy of the FOTOS leaflet "The Key to Perfect Reception."

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256/7 Bank Chambers. 329 High Holborn, W.C.
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Make your Set All-Electric without alterations of any kind by using an Ekco "All-Power Unit"



Plug-in That's all!

Disconnect batteries for ever—connect an "EKCO" Power Supply Unit to the same terminals—and your set is "All-Electric." No more mess—no more bother—no alterations to wiring—no new valves to buy—existing valves will work better and give better results. Simply plug the "EKCO" Adaptor in to the electric light or power socket and switch-on—That's all! Or you can partly electrify your set with an "EKCO" H.T. or L.T. Unit, eliminating H.T. or L.T. batteries, respectively.

"EKCO" products are British Made for D.C. as well as A.C. Mains, with Westinghouse Valveless Rectification in A.C. Models.

"EKCO" All-Power Unit, Model C.2.A. for A.C. Mains (as illustrated) H.T. tapping for S.G. Valve and at 60 and 120/150 volts. L.T. 2-6 volts. G.B. up to 12 volts. **£10 : 17 : 6.**

D.C. Model (exactly as above) **£5 : 17 : 6.**

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ALL POWER UNITS

Ask your dealer for details of Easy Payments and Free Booklet on "All-Electric Radio," including full particulars of "EKCO-LECTRIC" Radio Receivers, radio's supreme two and three valve sets.

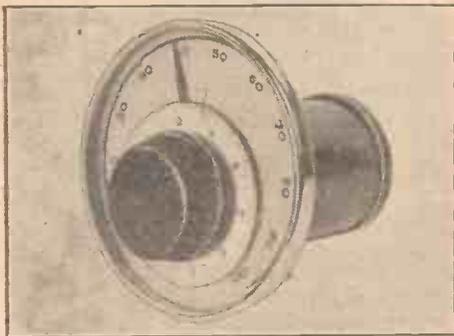
E. K. COLE, LTD., DEPT. K, "EKCO" WORKS, LEIGH-ON-SEA.

"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

Cifel Tubus Condenser

WE have received for test and report an interesting condenser known as the Cifel Tubus condenser marketed in this country by Messrs. Fonteyn & Co., Ltd. The design of this component departs from standard practice, and both the fixed and moving plates are identical in size and shape. The moving plates have a parallel motion controlled by a threaded spindle, providing



This Cifel Tubus condenser is a newcomer which embodies a unique movement possessing many advantages

a reduction gear of 20 to 1. The plates are completely enclosed in a celluloid container, which prevents the accumulation of dust.

There are two circular tuning dials, one being mounted eccentric with the other. The tuning knob rotates the vernier dial, which is divided into 100 divisions. For each revolution of this dial, a pointer moves over one-tenth of the main scale. With such a vernier movement, it is possible to make an accurate change of 1/1,000 of the full condenser movement, yet a fairly rapid travel is possible despite this fact.

The whole success of such a design must rely on freedom from backlash, and smoothness of motion; both these qualities are possessed by this condenser to a remarkable extent. It is indeed hard to detect any backlash whatsoever in the up-and-down motion of the moving vanes, whilst the action is quite commendably smooth.

The shape of the vanes has been designed to give a square-law variation, and the capacity range as measured on our standard bridge extended from .000011 to .000488.

It must be admitted that the appearance of the dials is somewhat unconventional, and it has one disadvantage in that a 1 3/4 in. hole must be cut in the panel in order to accommodate the instrument, but for precise tuning it would be hard to find a more efficient device selling at 12s. 6d.

"A.W." Solves your Wireless Problems

Climax Power Transformer

THE Universal type of mains transformer is a very useful instrument, for the voltage supply varies considerably in different districts. In addition there are some supplies meant to be 240 volts which in reality are more like 220 volts and consequently, if a transformer, designed for 240 volts is used, results do not come up to expectations.

This week we have received for test a Climax mains transformer intended for A.C. voltages of 200, 220, and 240. The actual voltage is marked at 200 and 240, but by connecting one terminal to 200 volts and the other to 240, a voltage of 220 is obtained.

A single secondary winding is provided which is intended to be used with a Westinghouse metal rectifier. The A.C. voltage on the secondary is approximately 140 volts and with the HT3 type of single-wave metal rectifier, an output of approximately 150 volts at 20 milliamperes is obtained. With the HT4 metal rectifier, the voltage becomes almost double and the rectifier in conjunction with this transformer can supply 200 volts at 30 to 40 milliamperes.

This transformer is wound on the standard Climax bobbin, two of these being placed side by side surrounded by a suitably designed iron core.



One of the range of Climax A.C. power transformers. The single-secondary-winding type is described in the accompanying paragraph

Messrs. Climax Radio Electric have had considerable experience with mains apparatus and this transformer is a worthy addition to their present range.

Grippall Dual-range Coil

EVERYBODY is speaking in terms of wave-traps at the present time and no wonder since the new Brookmans Park stations are playing havoc with single-circuit tuners.

Messrs. J. Rigaut have conceived the idea of including a wave-trap with a dual-

range coil and this may be put to use simply by adding a second .0005 variable condenser. The dual range coil consists of the normal long and short-wave windings with reaction. These are wound on an octagonal former and so arranged that the wire is held well away from the former. The ends are taken out to terminals which are clearly marked. A push-pull switch selects the waveband on which it is desired to tune.



This Grippall coil incorporates a separate wave-trap winding—a useful aid to selectivity

We tested this by connecting it in a simple single-circuit receiver and followed the instructions provided by the makers. Tested in our Laboratories—Brookmans Park transmitters are only 6 miles distant—the test on the wave-trap was a stringent one and we were agreeably surprised to find that the Brookmans Park station could be cut out almost entirely. Naturally some of the near-by stations suffered slightly from this trapping effect, but we could discern no difference in the strength of 5GB which came in just as well with the trap in or out except of course, that with the trap in circuit, there was no interference from Brookmans Park. The tuning range extended on the short waves from 225 to 575 metres and on the long waves from 540 to 2,500 metres.

It is found advisable in order to obtain the best effect with the reaction control, to connect a .0003 condenser from the plate of the detector valve to earth.

This is quite a practical device and can be recommended to readers.

NEXT WEEK :
POSSIBILITIES OF THE
1930 PORTABLE
NEW IDEAS FOR
HOME-BUILT SETS

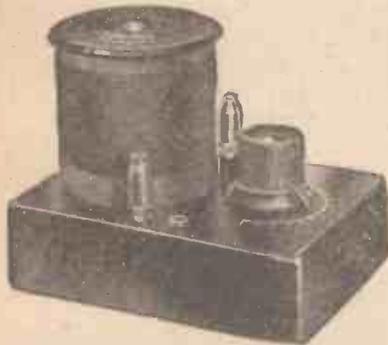
STOP INTERFERING!

WITH the new regional transmitters do you find it more difficult to separate programmes?

This can easily be overcome by simply fitting a Watmel Wave Trap between your aerial and the set.

It does not matter what length your aerial is, this Wave Trap will sharpen tuning and make reception clearer and more powerful.

Send for our Folder No. A/85 showing you how to make up a fine loud-speaker; also folder and Blueprint for building a modern 3-valve Set.



8'6

THE WATMEL WAVE TRAP

THE BALANCED ARMATURE UNIT

Genuine four pole unit. Highly sensitive. Perfect reproduction of both high and low frequencies. Will handle large volume without overloading, and is particularly suitable for operating linen diaphragm speakers as well as cones.

PRICE **18'6**

THE DOUBLE RANGE TUNER

Does away with all coil-changing. Highly selective and can be incorporated in any receiver.

Complete with wave-change push-pull switch. PRICE **12'6**

BROOKMAN'S PARK BY-PASS COILS

Special Brookman's Park By-Pass Coils, wound on paxolin former with double silk covered wire as specification. Price, each **3'6**



WATMEL WIRELESS CO., LTD.
Imperial Works, High Street, Edgware.
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C.M.1

THE ONLY BRITISH VALVE WITH A WRITTEN GUARANTEE AS TO PERFORMANCE AND LIFE.

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Matched Valves 1/- extra per set.

P.R. PRODUCTS,

INSIST ON P.R. VALVES

Why pay fancy prices when you can get a perfectly finished British made valve with a superior coating giving astonishing selectivity with a minimum H.T. consumption, which is the general opinion of the thousands who use P.R. valves. There are many valves on the market, but none are guaranteed—ask yourself why. The P.R. guarantee covers seven months with the right—not a favour, remember—but a right to exchange the valve under the guarantee. All you have to do is to post any defective valve to us, complying, of course, with the terms of the guarantee which is attached and enclose a note stating defect.—You will receive a new valve by return of post.

36, P.R. HOUSE, NEWGATE STREET, LONDON, E.C.4.

Opposite G.P.O. Tube Station.
Telephone: City 3788.

LIST OF DULL EMITTERS

	Type	Fil. Volts	Amp.	Imp. Ohms	Amp. Fac.	
3'6 EACH Post 4d.	PR 2	2	.095	28,000	13	H.F. Det.
	PR 3	2	.095	15,000	8	L.F.
	PR 4	2	.095	60,000	32	R.C.
	PR 9	3.5-4	.063	24,000	14	H.F. Det.
	PR10	3.5-4	.063	15,000	8.7	L.F.
	PR11	3.5-4	.063	65,000	40	R.C.
	PR17	5-6	.1	24,000	17	H.F. Det.
	PR18	5-6	.1	15,000	9	L.F.
	PR19	5-6	.1	80,000	40	R.C.
6'6 EACH Post 4d.	PR20	2	.15	7,000	6	Power
	PR40	4	.15	8,000	6	"
	PR60	6	.1	8,000	6	"
10'6 EACH Post 4d.	PR120	2	.3	3,800	4	Super
	PR140	4	.2	4,700	4	Power
15'6 EACH Post 4d.	SG 25	2	.2	220,000	150	S.G.

2 Valves or more sent POST FREE.

AMATEUR WIRELESS NOTEBOOK DIARY for 1930

This handy and compact reference book, which will be of assistance on many occasions during 1930, should be kept within easy reach by every wireless amateur. Here are some of the contents:

Conventional Symbols used in Wireless.
Technical Contractions.
Aerials and Earths,
Frame Aerials.
Wavelength Frequency Tables.
Notes on Accumulator Upkeep.
Coil-winding Data.

Useful Formula Section.
Calculating Condenser Capacities.
List of World's Short-wave Stations.
Choosing Your Valves.
Valve Tables.
Glossary and Definitions of Wireless Terms.

The "Amateur Wireless" Diary can be obtained at Booksellers for 1/6 (cloth) and 2/6 (leather), or by post (2d. extra), from "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4

5'6
DOWN

BRINGS THIS SPEAKER TO YOU

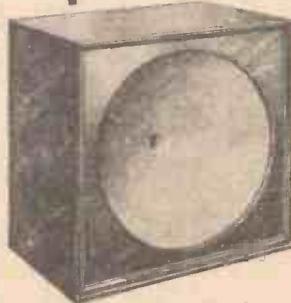
SEND FOR ONE TO-DAY—FOR ONE WEEK'S TRIAL. Test it at your leisure against ANY speaker at ANY price. We know it is the equal of any.

If you are not fully satisfied, pack it up and return it to us within a week, and your money will be refunded.

If you decide to keep it—remember your judgment is final—remit the balance, 30/-, or if you prefer it, 2/6 a week for fourteen weeks. C.O.D. 5/6.

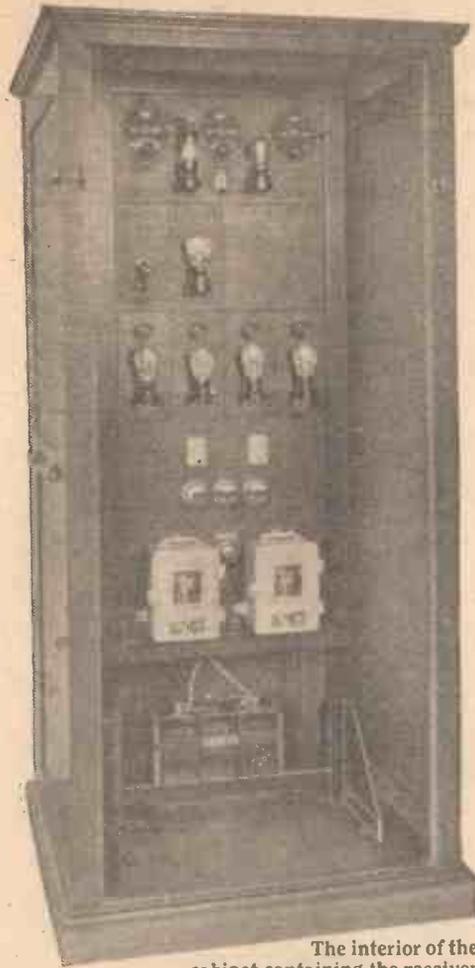
SPECIFICATION.—Full balanced electro-magnetic armature and powerful cobalt steel permanent magnets. The special P.R. paper Cone is perfectly free to move and floats against the baffle; the cabinet is of oak heavily reinforced by a special frame designed to prevent sympathetic resonance. The whole is finished in highly french-polished natural oak, and measures 13 1/2 by 13 by 6 in. with 1 1/2 in. cone.

GUARANTEE. Money refunded without question if not satisfied and returned within seven days.



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Sent C.O.D. if desired. Opposite Post Office Tube. Telephone: CITY 3788

Please Mention "A.W." When Corresponding with Advertisers



The interior of the cabinet containing the receiver

576 PHONES ON 1 SET

ALTHOUGH phones are popularly supposed to be as dead as the dodo (whatever kind of bird that may be), there are hospital and institution patients all over the country who do not share this belief.

The famous Chelsea Pensioners have just had a giant phone radio set installed for their benefit at the Royal Hospital, Chelsea, and as this set has no fewer than 576 pairs of phones working on its output, its electrical arrangements are rather interesting.

Listeners will recall a recent weekday broadcast when the opening of this huge set and the ceremony in which Viscount Cowdray and Lord Arnold participated were relayed by the B.B.C. The fact that this receiver is for the use of the "Old Guard"—the Chelsea Pensioners—makes this broadcast of unique interest.

A good idea of this 576-phone outfit can be gathered from the accompanying photograph. If you have ever tried to operate more than two or three pairs of phones from your set you will realise the difficulties which have to be contended with in supplying 500-odd pairs, and not all at the same time, but in varying numbers so that the output load is never constant.

The set itself is housed in a cabinet like a telephone box, and has been designed by the Marconiphone engineers to be as simple as switching on and off the electric light.

A trouble to be feared, which the average amateur would like to avoid, is the fact that the whole set had to be made operative from the mains supply, which at present is 230 volts D.C., but will shortly be changed to A.C. Everything has, therefore, to be arranged so that when the A.C. "juice" comes on, the whole H.T., L.T., and G.B. arrangements will not have to be scrapped; no easy matter!

The circuit has eight valves on the L.F. side, two L.F. valves supplying the output to a separate bank of phones. The 576 pairs were split up into four banks, and as each is operated from a separate set of L.F. valves, each bank is individually controllable. This should be a useful tip for those who are called upon to fit up a set supplying a number of phones and speakers for a small flat, for example.

The receiver is normally tuned to one of the "B.P.'s," and is automatically switched on at selected times, thus requiring no attention. This is done by a clockwork time-switch arrangement. K. U.

MY CONVERSION By a "B. C. L."

IF you happen to know anyone who is the fortunate possessor of the Postmaster-General's licence to carry out experiments in wireless transmission, get him to let you spend an hour or two with him one night when he is "on the air." I have just spent a little while with one who is something of an expert in this branch of radio and thoroughly enjoyed the experience.

We took our seats in his radio shack amidst a wonderful array of weird-looking coils of wire, valves, and instruments; each put on a pair of headphones, and in the silence I listened whilst he adjusted the dials of the receiver.

"Peep-peepy-peep," came a weak musical sound. "That's a German calling the States," said my friend. Another slight turn and a noise like a rip saw. "One of those blighted raw A.C. merchants"—this in a tone of disgust. It appears that these particular "merchants" are not in favour, though I didn't learn why.

"Ah!" from my friend, as a clear bell-like note came through. "That's the stuff; let's try and get him."

A little wait while the bell-like note continued, and then he pulled over a switch to the accompaniment of a whirring sound from beneath the table (this was the

motor generator starting up), and then began to tap out something with the morse key.

This finished, we listened again. Back came the answer without fail—a sound very like the old-fashioned musical glasses, sweet and clear.

"What's he saying?" "Thanks for reply, glad to hear you to-night . . . here Copenhagen," he wrote down and a little more, consisting of code words and figures I didn't understand. We gave him a reply and shortly bade him good night.

The next one to come through was a Spaniard, Madrid this time, coming in, as my friend remarked, "like a ton of bricks." We told him he was "R8," whatever that may mean, and the senior seemed very delighted from his reply, as I saw it written down with many exclamation marks interspersed.

Now followed several attempts to get in touch with stations in Italy and North Africa, but without success, and my friend seemed a bit disappointed. However, we made up for it later on when we booked a "W," in other words an American station.

I am told this used to be fairly easy, but something has happened to do with "fre-

quencies" and the "Washington Convention" which has rather upset things and has made it much more difficult to "get across."

During the evening we heard the *Olympic* talking to New York by wireless telephone. It was wonderfully clear.

She said she was two days out of New York.

On another wavelength we heard some Atlantic phone from one of the big Continental commercial stations, and on still another automatic morse at a speed of hundreds of words a minute; unreadable, of course, but none the less of absorbing interest.

The whole universe seemed to have something to say, and in the silence of the night the effect was eerie and fascinating in the extreme.

Those of us whose knowledge of wireless is limited to switching on and off the household broadcast set—I believe we are dubbed by these wizards of wireless as "B.C.L.'s."—evidently miss one of its greatest attractions.

For my part I came away fully determined to learn morse as a first step towards getting in on this lesser-known side of the game.



"Why not hear the LOTUS in your own home?"

"Your dealer will gladly arrange it free, and without obligation to you."

Ask him to demonstrate one of the following—that which fits your need and price:

The Lotus 3-valve S.G.P. All-Electric Receiver at **£21 cash**. Very low in upkeep cost, no batteries required—worked from any A.C. Mains supply. Highly selective and covers a splendid range of stations.

The Lotus 3-valve S.G.P. Battery Receiver at **£13:15:0 cash**.

The Lotus 3-valve S.G.P. Battery Model Kit for home construction at **£7:12:6 cash**.

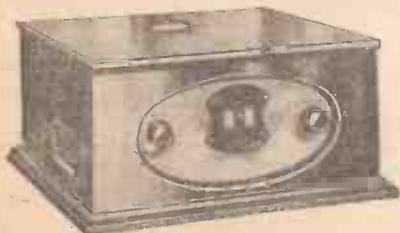
All available on the generous Lotus Hire Purchase terms.

Ask your dealer for particulars, or write for the Lotus Sets Catalogue and Hire Purchase terms.

LOTUS

ALL ELECTRIC RECEIVER

Gets the Best Reception



Made by the makers of the famous Lotus Components in one of the most modern radio factories in Great Britain.

GARNETT, WHITELEY & Co., Ltd.
(Dept. A.W. 6), Lotus Works, MILL LANE, LIVERPOOL

Causton

"EVERYBODY'S ALL - ELECTRIC 3"

(Continued from page 302)

increase in the voltage above normal, for example, has the effect of lowering the impedance and increases the total magnification actually obtained. A decrease, on the other hand, raises the impedance and lowers the amount of the magnification.

For easily regulating the voltage of the shield, an adjustable resistance is used in series with a fixed resistance, as indicated in the diagram, and is fitted to the front panel. Other parts on the front panel are the two tuning condensers, wave-range switches, and reaction condenser. A simple screen is used between the pair of coils and the tuning condensers, and this has a hole suitably placed for the shielded valve. Some valves are larger than others, and the size of the hole should, therefore, be checked before fitting the parts into the set.

The power unit itself has two parts: one comprises a transformer and high-tension rectifier, whilst the second is the smoothing circuit. In the transformer section is actually a metal rectifier, and this transformer also has a winding for the filaments of the valves in the set. The primary is tapped for two mains voltages, safety sockets being fitted. There is a fuse in the plug which fits the sockets.

The output from this unit is taken from two sets of terminals. One pair is joined to the filament circuits. No centre tap is used, therefore a potentiometer is fitted in the set. Actually it is near the detector valve. Its sliding contact is joined to the cathode terminals of the valve holders and also to earth and negative high-tension. This potentiometer must be adjusted whilst listening to the set. If it is quite out of adjustment a hum will be heard, but by turning the knob the hum will be reduced, and will disappear when the setting is correct.

A low-resistance potentiometer is used, there being no merit in a high-resistance component.

In this set a 4-volt power valve of the battery type may be fitted in the output position or a mains power valve. For detection a mains valve of the R.C. type, impedance about 20,000 ohms, should be fitted. Tests indicate that when this type of valve is used there is no need to connect the grid leak of the detector to the grid battery. Instead, it is taken to the cathode. Smooth reaction is obtained with this connection, and the ability of the detector stage to handle signals is such that the power valve will be overloaded before the detector.

An H.F. control is fitted to enable the input to the detector to be regulated over wide limits, with the result that the strongest of signals can be dealt with without overloading. Full details of the operation, with further constructional hints, will be given next week.

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gow, Leeds, Manchester, Newcastle, Nottingham.



THE PERISCOPIC TELEVISION SCANNER

IT is now possible to give further details of the periscopic scanner for television purposes which has been developed successfully by the Baird Television Corporation

jects them forward. This is made clear by an examination of one of the photographs, which illustrates the transmitter stand used by the Baird Company in America. Notice also that the rotating disc is completely enclosed in a case to protect it from damage and prevent dust accumulating in the tiny disc holes. It should be quite clear from the photograph that a skilled engineer can manipulate the angles of the



The periscopic scanner can be seen at the left in the top picture. The inset shows how the device is placed in front of the scanning disc



mirrors in relation to one another and also in relation to the optical axis of the lantern, so that the scanning beam is thrown in any required direction.

The device is simple, yet ingenious and

of America. It enables any selected portion of the studio to be transmitted by turning the spotlight beam in any direction somewhat like a searchlight. Previously it has been the practice for an artiste to sit in a chair something like the type one usually meets at the dentists. This was raised or lowered or moved round according to the height of the person being transmitted.

The procedure was essential, for the artiste was compelled to keep within a sharply defined area. Naturally this restriction of movement sometimes caused trouble owing to the person unconsciously moving out of the scanning beam. Furthermore, nothing outside the direct line of the beam could be sent over as a televised picture. The new scanner bids fair to overcome the bulk of these troubles. The artiste stands or sits comfortably according to his or her particular whim and the engineer in charge ensures that they are scanned properly merely by adjusting the beam to cover them.

Using Mirrors

The refinement is effected by an arrangement of mirrors placed immediately in front of the focusing lens of the spotlight projector. The moving beams of light strike the first mirror and are reflected upwards on to another mirror, which pro-

effective in practice. The second illustration shows an actual transmission taking place at one of the television studios. An artiste, who happens in this particular instance to be Miss June Collyer, is standing quite at ease and on the extreme left, mounted on the transmitting table, is shown the mirror device just described. The mobile nature of the first transmitter is a commendable feature and points to developments on lines which cannot fail to increase the scope of the subjects televised, and undoubtedly this will be of great advantage.
H. J. B. C.

Situations vacant and wanted is a new service broadcast from JOBK (Tokyo) every Monday, at 9.40 p.m. The station collects the data from the employment bureaus in Osaka, Kobe, and Kyoto the day previous to each broadcasting.

Advertising by radio in the United States in 1927 amounted to £752,002. In 1929 it was £3,745,913.

A radio organ in which the place of pipes is taken by wireless valves and the whole controlled by a three-octave keyboard is the invention of R. T. Hitchcock, of Westinghouse Electric Company, East Pittsburgh, Pa.

MORE RADIOGRAMS

ON March 8, Daventry 5GB offers to its listeners *In the Dark*, a play by Ernest Bramah. It is a thrilling episode in the experiences of one, Max Carrados, the blind unraveller of mysteries.

Paul Robeson, the negro vocalist whose "Old Man River" was sung and played throughout two continents, will again be heard through the London Regional station on March 20.

It is reported that a radio transmitting station is to be erected by the Holy See in a part of the Vatican territory originally intended for an aerodrome. This station will be used for transmission and reception of official messages.

According to J. E. Smith, of the National Radio Institute at Washington, D.C., 37 per cent. of the total number of broadcasting stations in the United States, or 229, derive their entire income from broadcasting commercial programmes.

Radio sets owned by the farm population of the United States number more than 2,512,000.

When the new Waldorf-Astoria Hotel in New York opens its doors in the summer of next year the rooms will be equipped for television as well as radio.

A report from Tokyo states that a plan to connect Japan and the South Sea Islands by wireless telegraphy will be realised during 1930. Telegraphic rates will be lowered when the new service is opened.

The result of a census taken by the Osaka broadcasting station in Japan, of listeners at Osaka City, for the purpose of classifying receiving sets has just been announced. Crystal sets, 10,364; battery-operated valve sets, 32,520; eliminator sets, 34,655.

When the North German Lloyd steamship *Columbia* left New York recently on her tour round the globe, a complete portable sound-reproducing unit was aboard, together with a large supply of talking films, for entertainment of the passengers.

The alternative programme appears to be a burning question amongst Budapest listeners, and in order to test its utility the authorities are experimenting with the old Csepel transmitter. Two different entertainments are being broadcast at irregular intervals on 550 and 210 metres. The power of the short-wave station, however, is such that its programmes can only be picked up in the Hungarian capital.

Following a series of experiments, the French Ministry of Posts and Telegraphs has finally approved the plan to increase the power and range of the Ecole Supérieure broadcasting station. Although suggestions were made to transfer the transmitter to a site outside the city limits, for the present new aerial masts are being erected in the Rue de Grenelle, Paris, and the plant is to be "pepped up." Work has also been

started in the neighbourhood of Pontoise, about fifteen miles to the north-west of the French capital, and it is rumoured in the Paris press that a high-power station is to be built there for the broadcast of the official programmes.

On a recent occasion the French P.T.T. transmitters relayed a charity fête given at the Paris Opera House. The *parleur inconnu*, who supplied a running commentary from 10.30 p.m. to 2 a.m., in order to secure a bird's-eye view of the show, was installed in the "flies" at a great height from the stage. The heat was so great that he was compelled to shed, in turn, the greater portion of his evening clothes and at midnight decided to don his pyjamas!

On many evenings towards 10.30 p.m. an English talk dealing with the Algerian centenary celebrations is broadcast by Radio Alger on 364 metres.

The official inauguration of the first radio-equipped train in France (Paris-Havre) took place on February 8. Some two hundred and fifty headphones have been installed in first- and second-class carriages.

An emergency wireless service is being provided by the

Postmaster-General between Kirkwall and the North Isles of Orkney until the original cable, which was broken by a gale early in January, is repaired.

It is not expected that all the necessary data in connection with the fixing of a site for the Scottish high-power station will be collected for at least six weeks. The B.B.C. vans meantime continue their experiments in the neighbourhood of Falkirk and Larbert. Immediately a site is selected, and the land acquired, work on the new station will commence.



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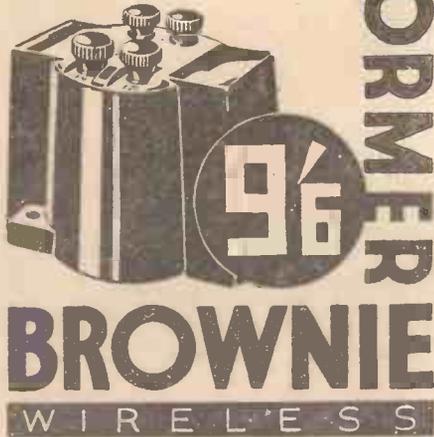
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Easy Set Testing

Q.—I often hook-up a receiver and, when finished, find that there is some slight snag in the construction. In several instances it has taken me some time to find out the cause of the trouble. I know that there must be some quick method of testing through a receiver, because experts in such matters could not possibly spare the time that I spend in looking through the circuits for the fault. Can you advise me of an easy and quick method of locating faults in a receiver of, say, three or four valves?—J. P. (Wigan).

A.—With present-day valves it is quite an easy matter to test through a set and eliminate different circuits until the offending circuit has been traced. The first thing to do is, of course, to switch on the valves. If no signals are forthcoming with the tuning controls rotated to their approximate positions, then flick each valve with the finger, when a slight ringing noise will result. If the set has an H.F. stage, the aerial should be disconnected from the aerial terminal and connected via a small capacity fixed condenser, to the grid circuit of the detector valve. Possibly signals will now be received, but at a weak strength. If this is the case, then the detector is probably working, but one of the amplifying stages is failing. Disconnect the speaker or phones from plate of last valve and connect across either the transformer primary or R.C. unit (anode resistance) in the plate circuit of the first L.F. valve. If signals appear to be normal strength, then the last valve circuit is the cause of the failing. If signals are still weaker than they should be, try joining phones or speaker across the anode-circuit instrument in the plate circuit of the detector valve. Although the impedance of the speaker or phones may not match that of the valve, in whose plate circuit they are connected, the results will certainly give some indication of the true state of affairs existing in that valve circuit. By eliminating the various part circuits of the receiver in this fashion, a quick and sure method of tracing trouble results.—C. L.

Grid Leak or Anode Bend?

Q.—I would be glad to know what are the relative merits of grid-leak and anode-bend rectification.—B. A. (Doncaster).

A.—When grid-leak rectification is employed, it is usual to apply a slight positive bias to the grid of the detector valve. Now, when a positive bias is applied to the grid of a valve and a signal voltage is superimposed on the grid, the positive half cycle of the signal causes a minute current to flow between the grid and the filament inside the valve. This current is known as grid current, and is a common source of distortion in a valve detector.

When the grid is given a slightly positive bias, it tends to cause the valve to amplify as well as to detect. Rectification occurs because the grid condenser isolates the grid from the filament of the valve, so that any electrons which become attached to the grid must necessarily remain there until the grid becomes so heavily charged that the energy so stored up suddenly discharges itself across the high-resistance grid leak to the filament. This cycle of events continues all the time a signal is being received on the grid of the valve. The values of the grid condenser and grid leak are chosen so that the charges are allowed to store up only to a certain point and then discharge themselves. In this way a fairly

regular charge and discharge takes place, or, in other words, the radio-frequency currents are split up or broken up into audible frequency trains of waves. It will be understood, therefore, that grid-leak rectification is to be preferred where sensitivity and amplification are the main essentials. Anode-bend rectification is different. The valve grid is given a negative potential (usually) with respect to the filament. This means that on no occasion, with a normally powerful signal; will the grid of the valve become positive with respect to the filament, and therefore no grid current can flow. Anode-bend rectification, therefore, eliminates one cause of distortion, namely, that due to grid-current flow. A glance at the characteristic of an anode-bend detector valve will serve to show that, although much more perfect rectification is permissible, due to the cutting off of the amplified negative half cycles of current, there is little or no actual amplification taking place inside the valve, apart from that necessary in the relay action.—C. A.

Indication of Distortion

Q.—I am told that if distortion is not taking place in a receiver, that a milliammeter needle, when this instrument is connected in the anode circuit of the last valve, should remain perfectly steady. I have been experimenting and can never get the needle of the instrument to remain steady. With a certain amount of grid bias the needle kicks downwards and increasing bias either causes the needle to kick both up and down or makes the needle kick upwards.—A. L. (Rhyl).

A.—When very strong signals are being handled by the last valve in a receiver it is quite a common experience to get the milliammeter needle kicking in both directions. This does not denote distortion necessarily, because quite possibly there is no actual overloading of the grids of any of the valves in the set. It merely denotes that the energy forming the amplified signal is of such magnitude that the initial surge of current passing through the last valve due to, say, an announcer beginning a sentence or emphasising a certain word, actuates the milliammeter needle. Normally, the meter needle will not respond to the fluctuating currents forming the signal, for the simple reason that the fluctuations are of too rapid a nature for instruments which, in their very nature of construction, lightness of moving parts, and so on, tend to be "dead beat."
C. L.

When Asking Technical Queries

PLEASE write briefly

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied. Queries cannot be answered personally or by telephone.

THE WAR OF THE TITANS

Jottings From My Log

By JAY COOTE

APPARENTLY both the medium and the long bands are to be invaded by a further squad of high-power transmitters. The decision taken at a recent European Conference to the effect that up to 100-kilowatts in the aerial was permissible is responsible for this fresh outburst of energy in the Continental broadcasting systems.

If we take what we have hitherto termed the long waves, we find that to-day they include Moscow Experimental (20 kilowatts) on 720 metres; the Trades Union transmitter in that city (40 kilowatts) on 938 metres; Leningrad (20 kilowatts) on 1,000 metres; Moscow Popoff (40 kilowatts) and Komintern possessing the same power. Moreover, adding to these Motala, Lahti, and Daventry 5XX, which it is reported will shortly double its energy, we still have in prospect Warsaw on 100 kilowatts to rattle the ether and as neither Eiffel Tower, Radio Paris nor Königswusterhausen have spoken their final word, we may expect developments in those quarters if they are to hold their own in the European concert.

Below 600 metres we already possess giants such as Oslo, Rome, and the two Brookmans Park stations, and the near future is to furnish us with two big transmitters in Switzerland, nine high-power stations in Germany, and giants for Prague and Bucharest, apart from somewhat weaker units in France, Italy, and other Continental States. Vienna, in view of the increase in the size of the Czecho-Slovak main station, now proposes to install a 100-kilowatt plant somewhere outside its city limits.

Powerful Wipe-outs

And so it goes on. This growing increase in the power of the individual broadcasts may cause some apprehension, inasmuch as to-day's conditions already demonstrate that the actual broadcasting band is too circumscribed to hold the number of stations now operating within its limits.

Turn to your receiver to-night and note the wipe-out effect which such powerful transmitters as Rome, Oslo, London, and so on have over their weaker neighbours. Friends from Aberdeen inform me that the Norwegian broadcasts already annihilate Daventry 5GB. To counteract this failing, is the British station to be pepped up?

Daily the ether is becoming more and more congested, and some Continental States possessing a number of transmitters, are seriously contemplating the reduction of exclusive wavelengths by the grouping of smaller relays on common wavelengths. Either this principle is to be adopted, or as an alternative, in order to give greater

frequency separation between high-power transmitters, a number of broadcasters must be taken off the air. With the arrival of high-power plant feeding an increased area, such a step may prove to be possible.

"COLD" EMITTERS

MANY people anticipate a time when it will be possible to operate valves with unheated filaments. The indirectly heated filament energised directly from the mains is, of course, a great advance on the use of accumulators, but it would be a still greater advantage to dispense with any heating current at all.

Some progress in this direction has already been accomplished. An electron current can, for instance, be extracted from a cold metal wire by applying an intense field. Currents up to several milliamps have, in fact, been obtained in this way. The emission is not uniform, but is generally concentrated at one or two points along the wire "filament," from which narrow pencils or streams of electrons emerge. This phenomenon has been called the "aeona" effect.

B. A. R.

ELECTROLYTIC RECTIFIERS

ONE explanation of the action of the electrolytic rectifier assumes the formation of an oxide film on the electrode. The film as formed is pierced with small holes, which grow larger when the electrode acts as a cathode and contract when the direction of the current reverses, thus favouring a one-way flow of current.

According to a second theory, a porous film is formed on the electrode in which molecules of gas are occluded. When the electrode is acting as a cathode, free electrons from the metal can pass through the film, but during the next half-cycle there are no free electrons available in the electrolyte, so that no current passes during this period.

M. A. L.

COLOUR TELEVISION

TELEVISION in natural colours depends upon the use of red, blue, and green light filters at the transmitting end, the light rays from each filter energising a separate photo-electric cell. At the receiving end, the separate wave-trains are applied to energise three different types of lamps. A neon tube is used for red light, a mercury tube for green, whilst a tube containing helium provides the blue rays. The three separate images are finally superimposed on the same viewing-screen. H.



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J.B. Precision Condensers make all the difference to the selectivity of a Receiver.

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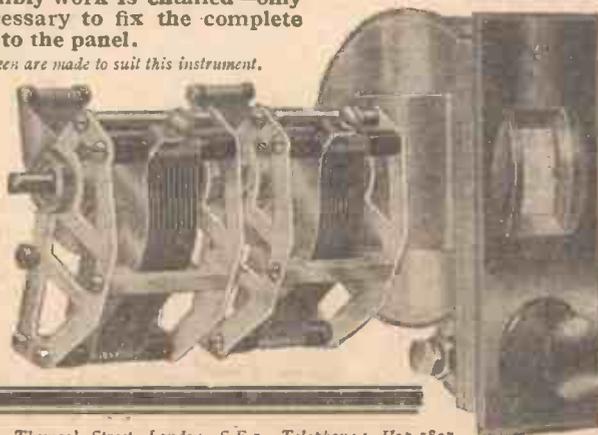
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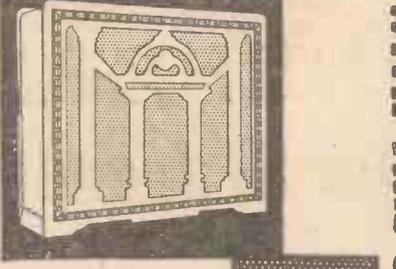
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BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is aerial energy.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN											
25.53	11,751	Chelmsford (5SW)	15.0	208	1,121	Strasbourg	0.5	*385	779	Genoa (Genova)	1.0
*200	1,500	Leeds (2LS)	0.13	*272	1,102	Rennes (PTT)	0.5	*441	680	Rome (Roma)	50.0
*242	1,238	Belfast (2BE)	1.0	280	1,049	Radio Lyons	0.5	453	662	Bolzano (IBZ)	0.3
261	1,143	London (2) tests	30.0	295	1,022	Limoges (PTT)	0.5	*501	599	Milan (Milano)	7.0
*288.5	1,040	Newcastle (5NO)	1.0	*293	1,022	Montpellier (PTT)	0.3	LATVIA			
288.5	1,040	Swansea (5SX)	0.13	804	986	Bordeaux (PTT)	1.0	*525	572	Riga	3.0
288.5	1,040	Stoke-on-Trent (6ST)	0.13	307.6	975	Radio Vitus	1.0	LITHUANIA			
288.5	1,040	Sheffield (6LF)	0.13	311	964.5	Agen	0.25	*1,033	155	Kovno	7.0
288.5	1,040	Plymouth (5PY)	0.13	*316	950	Marseilles (PTT)	0.5	NORWAY			
288.5	1,040	Liverpool (6LV)	0.13	329	914	Poste Parisien	0.5	364	824	Bergen	1.0
288.5	1,040	Hull (6KH)	0.13	331.4	905	Algiers	12.0	385	779	Frederiksstad	0.7
288.5	1,040	Edinburgh (2EH)	0.35	363	828	Radio LL (Paris)	0.5	445	674	Rjukan	19.0
288.5	1,040	Bournemouth (8BM)	1.0	369	815	Radio Toulouse	8.0	453	662	Tromsø	0.1
288.5	1,040	Bradford (2LS)	0.13	*391	788	Radio Maroc (Rabat)	2.0	453	662	Aalesund	0.3
*301	995	Aberdeen (2BD)	1.0	416	720.3	Paris (Ecole Sup. PTT)	3.0	453	662	Porsgrund	0.7
*310	968	Cardiff (5WA)	1.0	447	672	Lyons (PTT)	5.0	*493	603	Oslo	60.0
356	842	Brookmans Park	30.0	468	640	Eiffel Tower	12.0	POLAND			
*377	797	Manchester	1.0	1,444	207.5	Radio Paris	12.0	*313	959	Cracow	0.5
*390	753	Glasgow (5GC)	1.0	*1,725	174	Radio Paris	12.0	*335	896	Posen	1.2
*479	626	Daventry (5GB)	25.0	GERMANY				385	779	Wilno	0.5
1,554	193	Daventry (5XX)	25.0	*218	1,373	Flensburg	0.5	385	779	Lemberg (tests)	0.5
AUSTRIA											
*246	1,220	Linz	0.5	*227	1,319	Cologne	4.0	*408	734	Kattowitz	10.0
*283	1,058	Innsbruck	0.5	*231	1,283	Münster	3.0	1,411	212.5	Warsaw	8.0
*352	851	Graz	7.0	*239	1,256	Nürnberg	2.0	ROUMANIA			
*453	666	Klagenfurt	0.5	*246	1,220	Cassel	0.25	*304	761	Bucharest	12.0
*517	581	Vienna	15.0	*247	1,215	Kiel	0.35	RUSSIA			
BELGIUM											
206	1,460	Antwerp	0.25	*253	1,154	Gleiwitz	2.0	720	416	Moscow (PTT)	20.0
216	1,391	Verviers	0.2	*259	1,157	Leipzig	1.5	938	320	Moscow (C.C.S.P.)	51.0
220	1,364	Charleroy (LL)	0.25	*270	1,122	Kaiserslautern	0.25	1,000	300	Leningrad	20.0
244	1,220	Binche	0.2	*276	1,085	Königsberg	2.5	1,056	284	Tiflis	10.0
244.7	1,226	Ghent	0.25	*277	1,085	Magdeburg	0.5	1,100	272	Moscow Popoff	40.0
246	1,220	Schaerbeek	0.25	*283	1,058	Berlin (E.)	0.5	*1,304	230	Kharkov	25.0
*291.4	1,029	Lige	0.1	*283	1,058	Stettin	0.5	1,380	217.5	Bakou	10.0
339	887	Velthem	8.0	*283	1,058	Bremen	0.35	1,481	202.5	Moscow (Kom)	40.0
*509	590	Brussels	1.0	*315.8	951	Dresden	0.25	SPAIN			
CZECHO-SLOVAKIA											
*263	1,139	Moravska Ostrava	10.0	*320	937.6	Breslau	1.5	268	1,121	Barcelona (EAJ13)	10.0
*279	1,076	Bratislava	12.5	*325	923	Stuttgart	1.5	274	1,094	Seville	1.5
*293	1,022	Kosice	2.0	*372	806	Hamburg	1.5	*349	860	Barcelona (EAJ1)	8.0
*342	878	Brunn (Bruno)	2.4	*390	833	Frankfurt	1.5	426	703	Madrid (EAJ7)	2.0
*487	617	Prague (Praba)	5.0	*418	770	Berlin	1.5	443.8	676	San Sebastian	0.5
DENMARK											
*281	1,067	Copenhagen (Kjobenhavn)	0.75	*453	662	Danzig	0.25	SWEDEN			
1,153	260	Kalundborg	7.5	*456	657	Aachen	0.35	231	1,301	Malmö	0.6
ESTHONIA											
*206	1,013	Reval (Tallin)	0.7	*473	635	Langenberg	13.0	*257	1,160	Hörby	10.0
FINLAND											
*221	1,355	Helsingfors	0.9	*533	563	Munich	1.5	270	1,112	Trollhättan	0.45
*1,790	207	Labti	40.0	*560	536	Hanover	0.35	*322	932	Göteborg	10.0
FRANCE											
31.05	9,479	Radio Experimental (Paris)	1.0	569	527	Freiburg	0.35	*436	689	Falun	0.5
187	1,604	Lille (Radio Flandres)	0.3	*1,635	183.5	Zeesen	30.0	*542	554	Sundsvall	0.6
213	1,410	Fécamp (Radio Normande)	0.5	GRAND DUCHY				*770	389	Ostersund	0.6
220	1,364	Beziere	0.1	223	1,346	Luxembourg	3.0	1,200	250	Boden	0.6
238	1,260	Bordeaux (Radio Sud-Ouest)	1.0	HOLLAND				*1,348	222.5	Motala	30.0
240	1,250	Nimes	0.25	51 20	9,620	Eindhoven	30.0	SWITZERLAND			
248	1,171	Juan-les-Pins	0.5	*208	1,004	Huizen (through Hilversum) until 5.40 p.m. G.M.T.	6.5	*403	743	Berne	1.0
255	1,175	Toulouse (PTT)	1.5	*1,071	280	Huizen (through Hilversum)	6.5	*459	653	Zurich	0.63
265	1,132.2	Lille (PTT)	0.7	*1,071	280	Scheveningen Haven	5.0	680	442	Lausanne	0.6
IRISH FREE STATE											
HUNGARY											
ICELAND											
ITALY											
JUGOSLAVIA											

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

CHIEF EVENTS OF THE WEEK

Date	Event
Feb. 25	Vaudeville programme.
" 26	Le Roi d'Ys, opera by Lalo.
" 27	Hallé concert, relayed from Free Trade Hall, Manchester.
" 28	Eviles, a play by Val Gielgud.
DAVENTRY EXPERIMENTAL (5GB)	
Feb. 24	Le Roi d'Ys, opera by Lalo.
" 25	" Sky Larks," an aerial slide-slip arranged by Charles Brewer.
" 27	A Piccadilly Daily arranged and produced by Gordon McConnel.
" 28	Symphony concert, relayed from Queen's Hall.
Mar. 1	Vaudeville programme.
MANCHESTER	
Feb. 25	Liverpool Philharmonic Society Concert relayed from Philharmonic Hall, Liverpool.
" 27	Hallé concert, relayed from Free Trade Hall, Manchester.

BELFAST
 Feb. 24 The Vindictive Staircase, a ghost story set to music.

On about 1,250 metres, the Moscow broadcasting station carries out thrice weekly, at the end of the evening programme, a picture transmission on a new Russian system.

In view of a test made in December last by Ljubljana (Jugo-Slavia) for which the energy was increased to 5 kilowatts, the Jugo-Slavian authorities have decided to raise substantially the power of the plant. Within the next few months the station will take its place amongst the big European broadcasters.

LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

The "Talisman 2"

SIR,—I am a regular reader of your *AMATEUR WIRELESS* and *Wireless Magazine*. I am only a beginner; my age is twelve. However, I thought I would let you know how I am getting on. I have built several sets, but my first good set was the "Talisman 2"; I obtained absolutely marvellous results with it. I can get station after station on the loud-speaker.

C. (Cambridge).

The "Hartley D.X. Three"

SIR,—I am pleased to say that I made up the "Hartley D.X. Three" from your issue of December 31, 1927, and have obtained wonderful results from it. It is simply marvellous the number of stations that can be tuned in. I have seen, heard, and made up many sets since, but I am still hanging on to my "Hartley Three" for my own use.

H. (Sheffield).

Request Programmes

SIR,—I wonder why your correspondent, S. M. B. (London), should think "that those who choose the programme matter hardly ever listen to the programmes"? This may be true sometimes, but if those who compile the programmes do not listen to the transmissions, I expect they listen to the rehearsals, which is much the same. I do not agree with M. B. that the B.B.C. takes too little notice of the requests it receives. The B.B.C. must introduce a certain amount of items, otherwise it would be inundated with letters saying they lacked ideas, originality, or were mentally inert, or making other uncomplimentary remarks. I am convinced that the B.B.C. does its best and carries out all requests whenever possible.

A. M. H. (Coventry).

American Receivers

SIR,—Your correspondent, J. W., who compares American sets with British to our disadvantage, is not quite fair to the British manufacturers. One of the reasons for the comparatively low prices of the American sets is that the American has been educated to accept standardised and mass-produced goods if their virtues are shouted about enough. The Englishman is accustomed to decide more exactly what he wants, and to insist on getting it. Our manufacturers are obliged, therefore, to produce a much bigger range of models.

In addition, they are handicapped by having to cover two widely dissimilar wavebands, and in all-electric sets, to which

J. W. mainly refers, the Americans have the enormous advantage of a standard supply.

Comparisons by the number of valves are misleading. Valve for valve, the British sets are distinctly more efficient. Many American sets get no more amplification with three screen-grid valves than some of ours get with one.

I cannot suggest a British equivalent of his luxurious nine-valver at 175 dollars—is this really a typical specification?—but there are three or four sensitive moving-coil sets I could name at about his other figure, 275 dollars, or roughly £55.

P. R. L. (London, W.).

The Programmes Again

SIR,—I have always been an interested reader of Mr. Moseley's column since its inception and with many of his conclusions I entirely agree.

I was the most interested, however, in the letter from Mr. Drew, of Walton. He seems—with those around him—to have voiced the demand of the majority of listeners of my acquaintance also, a demand for brighter and livelier music: musical comedies, military bands, comic operas, and lively orchestral music—in fact, something of the "song and dance" of life—and less yap.

The demand for highbrow, alleged classical, music appears to me, and many more, to come from a minority to whom the mere mention of "classical" music seems to breathe the air of culture with a big "C."

It is only, perhaps, a coincidence that a large watering place near here, which boasts of a well-known "symphony" orchestra, has in ten months' working suffered a loss of £10,000 on its concert programmes—evidence, perhaps of the public taste.

The everlasting symphony, Promenade, Hallé, Philharmonic, and other concerts, combined with the usual sabbatarian dirge on Sundays, with which the ether is now agitated, are to many ears—including my own, of course—reminiscent of that gastronomic delicacy which accompanies the onion at supper in many parts of the country, and is driving radio listeners into the ranks of gramophone users.

W. R. A. (Wimborne).

A Good Set

SIR,—Having built the "1930 Ether Searcher," a few weeks ago, I thought you would be interested to know how very delighted I am with this truly remarkable receiver.

SERVICE MODEL STEEL MASTS

NO HOLES TO DIG

26 Feet high. In 3 sections of 1 1/2 in. Steel tube tapering to 1 in. Carriage, London 1/6; Midlands 2/6; elsewhere 3/6. Weight 24 lbs. **15/-**

34 Feet high. In 4 sections of 1 3/4 in. Steel tube tapering to 1 in. Carriage, London 2/-; Midlands 3/-; elsewhere 4/-. Weight 34 lbs. **21/6**

The "SUPER" MAST
42 Feet high. In 5 sections of heavy 1 1/2 in. Steel tube tapering to 1 in. A real bargain. Carriage, London 2/6; Midlands 3/6; elsewhere 4/6. Weight 46 lbs. **29/6**



P.R. No bother. These masts are easy to erect, damp and rot proof. Made of sturdy British steel tubing tapering from 1 in. to 1 1/2 in. in 9 ft. sections complete in every detail. Cast iron bed plate, steel ground pegs, stay rings and galvanized wire stays cut to length, pulley bolts, washers, etc.—**No Further Outlay.**

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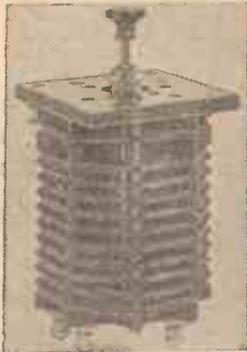
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Once in and it stays in. The secret lies in the special spring-metal, from which the prongs are made. Entire flex—copper, rubber and braiding—individually gripped without use of tools. It's the plug for every battery socket, the plug that ensures good contact, and thanks to its neatly engraved top, ease of connection. Ask your dealer, or send to us, for FREE Belling-Lee Handbook, "Radio Connections."

BELLING-LEE
FOR EVERY RADIO CONNECTION

Advertisement of Belling & Lee Ltd.,
Queensway Works, Ponders End, Middlesex.

I was able to construct the set complete one Saturday evening, thanks to the very simple and detailed instructions given in the issues of AMATEUR WIRELESS. I may mention that my knowledge of wireless construction is negligible.

A few nights later I was able to log twenty-seven stations in forty minutes, all at good loud-speaker strength. The speaker is a linen-diaphragm type with Blue Spot unit, and I have an outdoor aerial about 60 ft. long, probably not so efficient as it might be. I would mention that all my friends are astounded at the results I get, and several of them have now made up the set and I am sure are as delighted with theirs as I am with mine.

L. (Bedford Park).

Cost of Licences

SIR,—I have read with hearty approval P. D.'s (Towcester) comments on the cost of issuing licences in your issue of February 8. In spite of the ridicule poured on his head, he is fighting for a good cause, and in the interest of all listeners, I take off my hat to him.

Could not some scheme be devised, whereby our licences would be issued to us *via* the larger radio stores throughout the country? This, I know, is a bold proposal; possibly, too, it is quite impracticable. I have not investigated the matter, however, it is only a suggestion.

Certainly the B.B.C. would require to send out the postcards through the Post Office, but the actual work of issuing the licences could be left to the stores. As to remuneration, that is a matter for the B.B.C. and the stores.

This, I think, would also be good for the stores from a business point of view, since it is bound to bring a large number of people into them.

Can we not interest the three million licence holders in this matter, and set the three million brains working, until we discover some system whereby the money, which we spend on broadcasting may be spent on broadcasting?

"ONE OF THE THREE MILLION"
(Cambuslang).

Grosvenor House Broadcasts

SIR,—I have read with considerable interest the article "'Canned' Broadcasts" in your issue of February 8.

Your contributor would appear to be under the impression that the Grosvenor House programme at 10 p.m. on Sundays is a gramophone concert; actually this is not the case, nor is the Carreras concert at 6.30 p.m.

With congratulations on the standard of your excellent paper.

RADIO PUBLICITY LTD. (London, S.W.).

A series of wireless recitals by choirs from different parts of Scotland has been arranged to take place in Scotland between now and the end of March.

1/9 POST FREE **WHAT STATION WAS THAT?**
Why be limited in your choice of programme? Thousands of wireless sets are installed throughout the country which could bring boundless pleasure if their owners could use them to their full advantage. With the B.G.L. RADIO STATION FINDER the choice of the world's finest programmes is yours.
IDENTIFY THE STATION CALLING. TUNE IN THE STATION YOU LIKE.
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stations ought easily to be picked up by any modern set. The B.G.L. RADIO STATION FINDER enables you to identify any station calling or to tune in to any of the **WIRELESS STATIONS** you like. No technical knowledge necessary. Eliminates oscillation. Can be used with any valve set. The readings of every station within the range of your set are **GUARANTEED** by the manufacturers or your money refunded.
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WAVE-TRAP KIT. .0005 variable Condenser, Knob and D'al., .001-mfd. fixed, 260 and 400-metre 2-pin coils and Bases, Mahogany BBC/15 Cabinet, 5½ in. by 4 in.; the Set 10/-.

GRAMM PARTS. Waimel Tonearms with Loewe or Acuston Pick-up, 19/-. Panatrop Electric Mains Turntable Motors, £3 10s. Metal Cabinets, 17 by 8 by 9 in. reduced to 10/6. Colvern Aluminium S.G.B. Panel, drill d and cut, black finish, 4/- only. Magnet Earpiece Units, wound ready for making own Pick-up, 1/6. Brown "A" 750-ohm Phone, 7/6. Three-valve mains-operated Panatrop Amplifiers, 70/-. R.K. Cones, fitted B.T.H. Moving Coil, 100 surplus, all moving 7/6 each. Marconi L.S. Magnet Pots, 6 v., for Moving Coil Cones, 20/-. Moving-coil Loud-speakers, £3 10s. Ball Bearing Turntables for Portables, 3/- each.

RECEIVERS. 3-Valve S.G., Det., and L.F. Lamplugh with 3 Osrams, £4 15s. G.E.C. Victor 3, with valves, £4 2s. 6d. R.A.F. Aircraft semi-portable 3-v. receiver with valves, £1 17s. 6d. R.A.F. 10 Receiver 5-v. Set with valves in Polished Cabinet, £6 10s. Heligogen Underground Aerials, 1/6.

THE VIOLINA CABINET LOUD-SPEAKER DE LUXE. Wonderful reproduction, complete tonal range. Beautifully polished mahogany. List, £5. Sale price, 22/6.

BATTERY CHARGERS, etc. 2-, 4-, or 6-volt Trickle or Full Charge, Phillips, Ediswan, Ella, etc., 50/-. Kit, with Westinghouse 9-volt lamp Rectifier and 200/250-volt Transformer for charging or M.C. magnets off A.C. mains, 30/-. The DIX D.C. Mains Unit, Hurdless Filter, 3 taps, 30/-. De Luxe Model with M-tr, 40/-. A.C. Unit with Control and 3 taps, Two Valves and Special Filter, £4 10s.

VIBRO-MASSAGE SETS, with electric motor, for home use. Cost £4. New, in case, Sale, 25/6. X-Ray Tubes, 35/-. Neon Lamps, 2/6. Helio or Television, 5½ in. reflectors, 1/-.

ELECTRIC. 220-volt Blowers, 30/-. Flat Irons, small, 5/-. Medium, 10/-. Electric Two-Plate Cooker, 12/-. Single Hotplates, 7/6. Immersion Heaters for 3/6, with plugs and cord. Electric Soldering Irons, all sizes, from 5/6. Glass Boring Outfits for lead-in holes in window, 10/6. If you cannot call at our showrooms, send addressed envelope for our illustrated list to

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ARE THERE SIDEBANDS?

ACCORDING to Sir Ambrose Fleming there is no justification for the statement that broadcast transmission consists of a central "carrier" wave accompanied by spreading fringes of sidebands. He regards the sidebands as merely a convenient mathematical fiction having no foundation in reality.

The view that has generally been accepted heretofore is that the carrier wave is "spread" in the process of modulation so that it occupies a width in the ether double that of the applied speech or musical frequencies. For this reason, broadcasting stations are in practice separated from each other by a frequency gap of at least 10 kilocycles so as to prevent heterodyning.

Sir Ambrose's view, however, is that the message is actually transmitted on a single wave of one constant frequency though of varying amplitude. He denies the existence of any multiple frequencies caused by modulation. M. B.

RADIO IN WINTER

SLEET and snow are the two winter bugbears of engineers in charge of any high-powered transmitting station. A heavy fall of either is liable to strain the aerial system to the breaking point, and bring down a mass of wires which may take weeks to restore. In addition, the antennae, when loaded with snow, are de-tuned by the additional capacity, and this throws the system out of gear with the H.F. power supply. Finally, by bridging over the insulators, a deposit of snow may set up a high-resistance leak to earth, which will in turn reduce the radiation to a fraction of its normal value.

In most power stations, after a storm, a heavy current of some 150 amperes is sent through the whole aerial system. This generates sufficient heat to dry off any deposit of sleet or snow that may have been formed on the wires. M. A. L.



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Copies of "Amateur Wireless" and of "Wireless Magazine" containing descriptions of any of these prints can be obtained at 4d. and 1s. 3d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

TELEVISION AND ETHER CONGESTION

THERE seems to be considerable difference of opinion as to the width of the frequency-band necessary to transmit television signals through the ether. The conditions for sharp definition require say, 10,000 elementary areas in each square inch, which corresponds to a 100-mesh half-tone block.

Now if one elementary area is bright (so that current flows), and the next one is dark (when no current will flow) there will be 5,000 distinct impulses sent each time the picture is "scanned." The scanning must be repeated fifteen times per second to reproduce "moving" effects, so that the side-band width is 75,000—which is more than sufficient to accommodate seven ordinary broadcast programmes. This width can of course be reduced, but only by making a corresponding sacrifice in definition. M. B.

STATIC AND MAGNETIC FIELDS

TWO electric charges at rest tend to repel each other. Suppose they are set into motion. As they move they begin to take on the properties of an electric current, i.e., each charge develops a magnetic field. Now the magnetic fields between two currents moving in the same

direction, parallel to each other, is one of mutual attraction.

When, therefore, the two charges in question are moving at the velocity of light, i.e., when they form an electric current, the original electrostatic repulsion has been converted into an electro-magnetic attraction. This illustrates the difference between an electric charge at rest and in motion, and affords an interesting insight into the essential equivalence of electric and magnetic fields of force. A. H.

RADIATION AND ELECTRONS

TRANSFER of energy by radiation can only take place through the movement of "free" electrons. By contrast there are "bound" electrons which are constantly moving at immense speeds around the central nucleus of each atom of matter. Although they move in a circular orbit and are therefore constantly changing direction (which in the case of "free" electrons tends to set up radiation) such "bound" electrons do not normally liberate any energy from the system.

But if the atom is acted on by heat, or otherwise, some of the "bound" electrons may be shot off, or the whole system may break up and re-establish itself in smaller orbits. In this case, a "quantum" of energy is released and is radiated out of the atomic system into space as a wave of light or heat. M. A. L.

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Wireless Wit

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"Why," he exclaimed, "I really don't see my way to increasing your salary. You have nothing much to do. Half the time you are merely standing about listening to other people broadcasting."

"Yes, sir," replied the announcer sadly, "that's just it!"

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A SUGGESTION

"THIS is London No. 1 broadcasting Programme A. Programmes B and C are being sent out from 5XX and 5GB respectively." Such an announcement is a possibility if a new programme scheme suggested by Whitaker-Wilson, the *Wireless Magazine* music critic, were adopted.

The March issue of the *Wireless Magazine* was published on Friday (February 21). Fifteen pages are devoted to special "beginner" articles.

If you are an old hand, you will be interested to compare your own explanations to beginners with those contributed by the *Wireless Magazine* experts. All the articles are based on the practical, rather than the theoretical, point of view, and for this reason are particularly valuable to the newcomer to our science.

A feature of our contemporary that always attracts is the excellence of the illustrations, which are far ahead of those in any other radio monthly. There are more than 170 photographs and diagrams in the new issue.

WIRELESS IN PARLIAMENT

Sir Nicholas Grattan Doyle asked the Postmaster-General whether it was the intention of the Government to incorporate the staff of the British Broadcasting Corporation into the Civil Service in order to secure a greater degree of control over that organisation.

Mr. Viant said that the reply was in the negative.

The broadcast "smoker" is becoming quite prominent nowadays in Scottish broadcast programmes.

Buenos Aires, in South America, compares with New York City in North America in the ownership of broadcasting stations. That city has the largest number in the southern continent—twenty-two.

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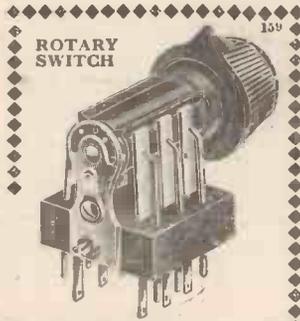
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