MAKING A NOVEL LINEN SPEAKER

W. JAMES ON THE NEWEST AERIAL CIRCUITS

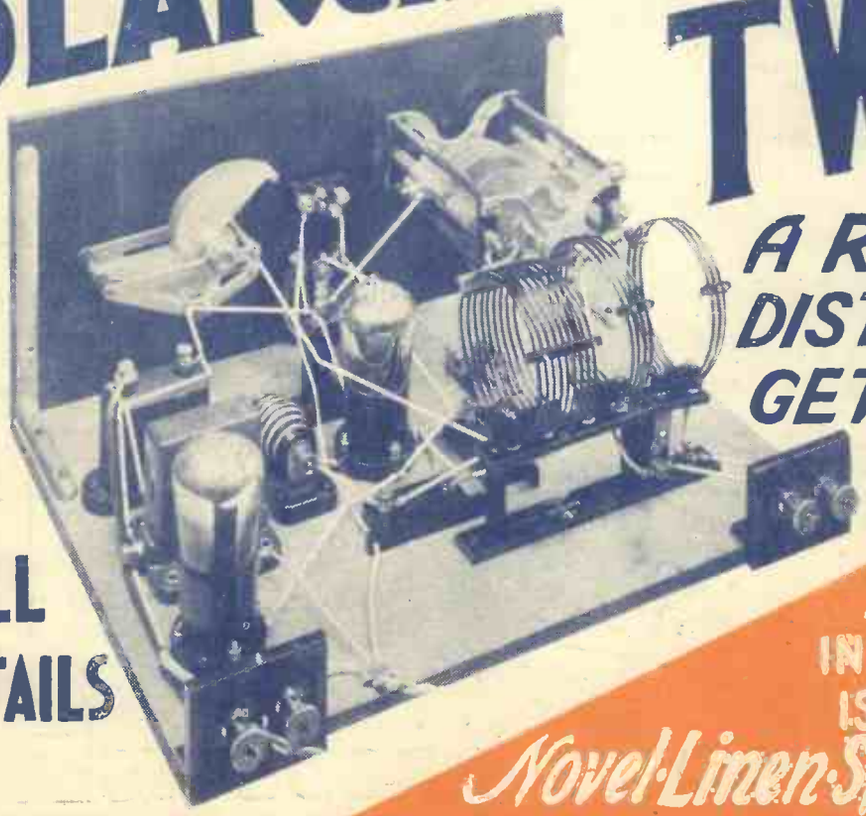
Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVII. No. 442 Saturday, November 29, 1930

The SEARCHER SHORT WAVE TWO



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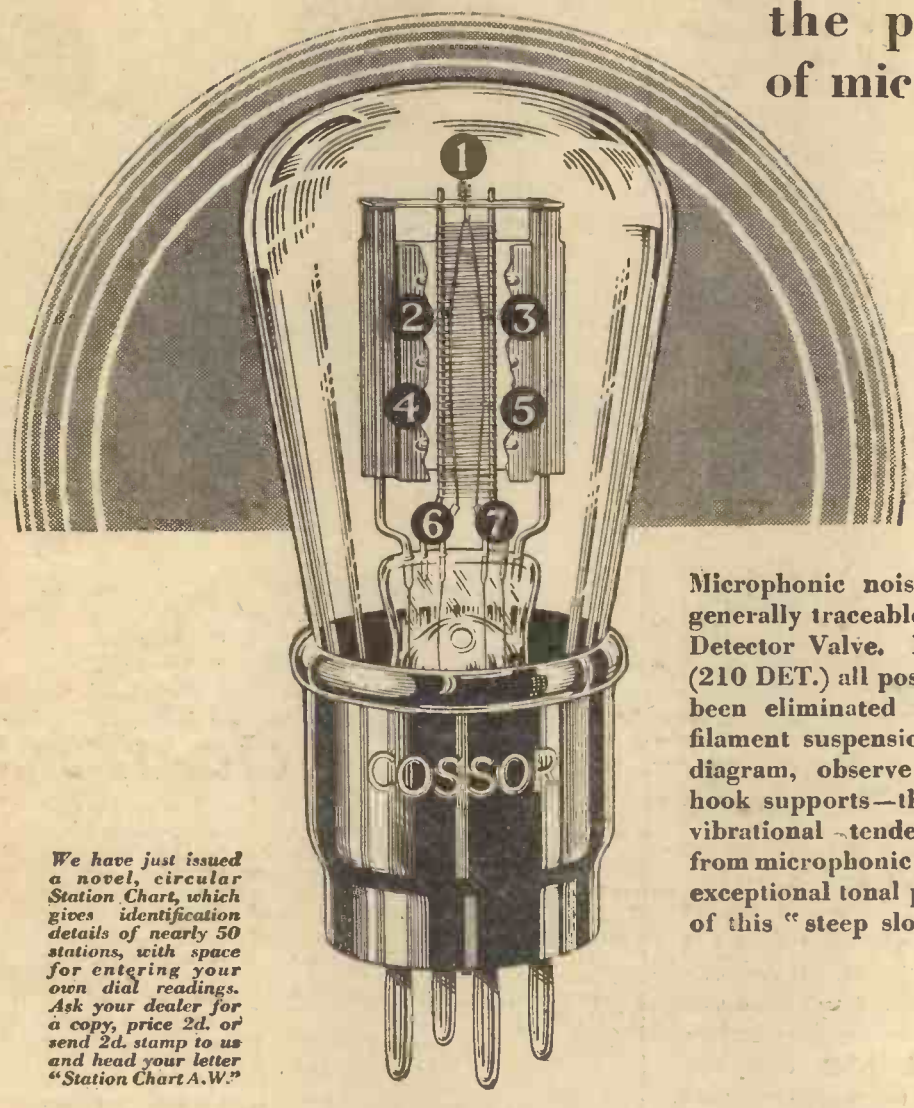

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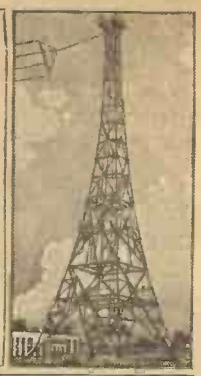
No. 442. Vol. XVII. NOVEMBER 29, 1930

821

Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J.H. REYNER B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

NEXT WEEK— OUR CHRISTMAS NUMBER

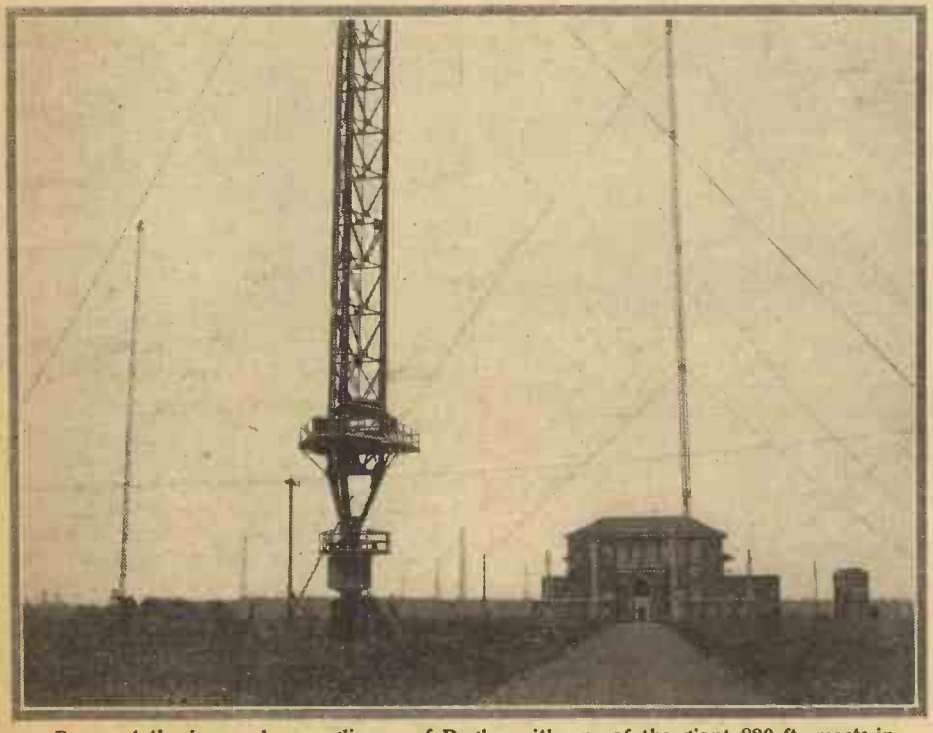
CHRISTMAS is close at hand, and next week's issue of AMATEUR WIRELESS is our Special Christmas Number, which will make you think deeply about Christmas holidays, Christmas festivities, and (last, but not least) Christmas radio! Make sure, at the newsagent's, of getting your copy of this bumper number, for it will sell like hot cakes: a coloured cover, and seventy-six pages chock full of helpful, constructional, and entertaining features; bigger than ever—but the usual price, 3d.

SPONSORED PROGRAMMES AGAIN

THE topic of sponsored programmes is on everybody's lips, and as it seems inevitable that advertising programmes of some form will come in time, it is a good thing that the listening public is now thinking deeply about it. Don't overlook the fact that there can be two kinds of sponsored programme: one the occasional big effort of an advertiser to whom cost means nothing, when he will put over an "all-star" programme, and the other the average effort of small firms, who can only afford to give broadcast matter inferior to that now offered by the B.B.C. We *do* want the big effort, because it will mean a type of programme which the B.B.C. could never hope to afford; but we don't want sponsored programmes which are no better than State-provided programmes. There are plenty of British firms who could afford to give fine programmes.

A CONSIDERED OPINION

THIS logical idea was well expressed by the Editor of AMATEUR WIRELESS when, in a leading article in the October issue of *Wireless Magazine*, he said: "Anybody with brains and money ought to be able, *just for one hour*, to put out a better show than the B.B.C. can in the nature of things put out continuously. . . . Sponsored programmes might be the spiced morsels in the regular plain but nourishing menu, and would add a new zest to listening."



Down at the base. A new glimpse of Rugby, with one of the giant 820-ft. masts in the foreground. Rugby is the transmitter for the P.O. transatlantic telephone, and a short-wave transmitter is sometimes used

PRINCIPAL CONTENTS

ANNOUNCERS' SALARIES

WHAT salary do American announcers receive? When the question was submitted to the National Broadcasting Company, a representative said: "The announcers' regular pay is nothing to speak of. It's the commercials he gets that count. For example, when Graham McNamee announces a commercial programme, he gets £50, in addition to his salary, and during the winter he usually has at least four commercial programmes a week."

IN AUSTRALIA

IF imitation really is the sincerest form of flattery, then AMATEUR WIRELESS is flattered! A popular Australian contemporary was interested in the special article which was published in AMATEUR WIRELESS No. 427, telling how it is possible to telephone from a sixty-mile-an-hour express train. As, no doubt, the article was considered of great interest also to Australian amateurs, it was reprinted word for word

NEWS & GOSSIP OF THE WEEK —*Continued*

under a different title. It is unfortunate that no acknowledgment of AMATEUR WIRELESS was made, but, then, our Australian readers who saw the article in AMATEUR WIRELESS some three months before it appeared in the Australian magazine will have no doubt as to the origination of the information.

A BRITISH PRODUCER FOR CANADA

TYRONE GUTHRIE, author of *The Squirrel's Cage*, has been engaged by the Radio Department of the Canadian National Railways to produce a number of plays specially written for the microphone. The close co-operation of the B.B.C. has been granted, and the technique which has been perfected in our studios will be closely followed. The plays will be presented either in Montreal or Toronto, and will be broadcast simultaneously by all the C.N.R. stations.

SIGN, PLEASE!

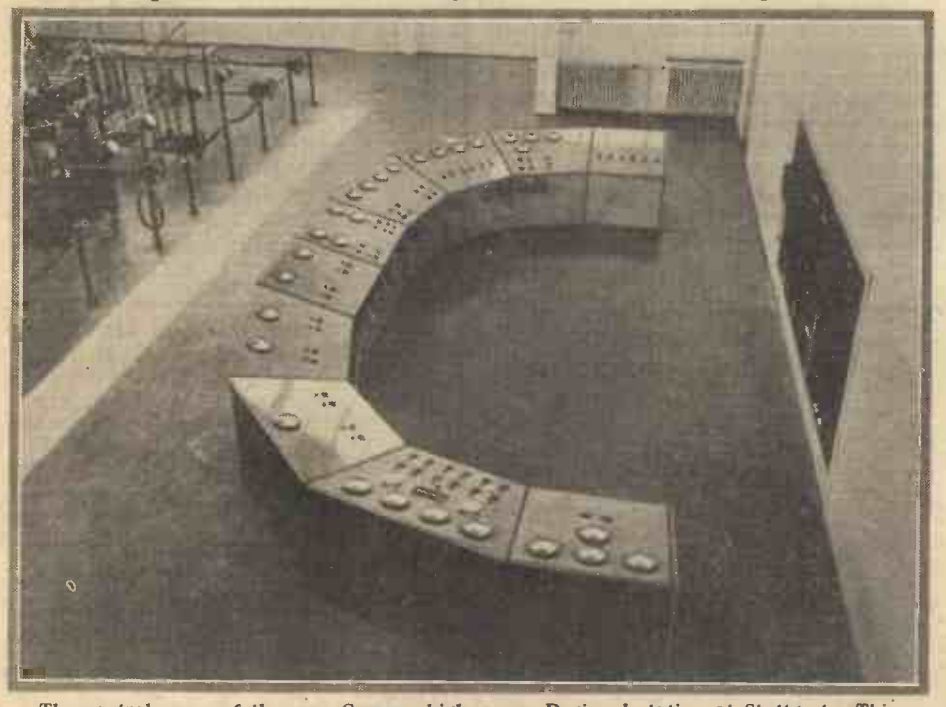
UPON entering an exhibition held recently in New York, visitors were somewhat surprised to hear a voice, coming apparently from nowhere, inviting them to sign their names in the book! When each visitor entered the exhibition he interrupted a beam of light directed on to a photo-electric cell, and thus automatically set a gramophone in motion, which was connected through an amplifier to a hidden speaker.

JAZZ RECORDS BY RADIO

RECENTLY a trapper, stationed at the Hudson Bay post at Fort Simpson, 700 miles north of Edmonton, decided that new records for his portable gramophone would be welcome. Through the Fort Simpson wireless station he broadcast a request for some of the latest dance records. His "musical S.O.S." was picked up by the Canadian National Telegraphs' operator at Edmonton, who purchased a selection and dispatched them by aeroplane. The trapper had his records within two days. Before wireless and aerial transport the records would have been out of date long before delivery.

B.B.C.'s INTERVAL SIGNAL

AS soon as the apparatus is delivered, which should be within the next two or three weeks, B.B.C. stations will introduce an interval signal. This will resemble the ticking of a clock, similar to the sound made by several Continental stations during their intervals. But it should be made clear that the B.B.C.'s interval signal is not intended as a means of identifying the station, but to reassure listeners who have switched on during a blank period in the programme that their sets are working correctly. The interval signal will generally be broadcast when a programme falls short of its scheduled time. Where the interval is more than five minutes, piano music will be broadcast in the usual way. We think that, while the B.B.C. is doing an interval signal they might as well have thought of something more distinctive, in order that foreign listeners could identify and distinguish between the various B.B.C. stations.



The control room of the new German high-power Regional station at Stuttgart. This "bird's eye" view of the control desk gives an idea of the large number of tuning controls and adjustments which have to be made in a transmitter, and it is interesting to compare this with the two simple control desks at Brookmans Park

OUTSIDE SAVOY HILL

PASSING through the portals of the B.B.C.'s Headquarters at Savoy Hill the other day, an AMATEUR WIRELESS correspondent noticed four struggling and perspiring men heaving up a grand piano to one of the studios, in preparation for a famous artiste's broadcast. After some false starts the piano was hoisted, one of the men exclaiming: "Well, Bill, I hope it goes alright over the air." Another replied: "I wish it *would* go on air; save us some (blank) trouble!"

END OF STUDIO OPERA

FOLLOWING the announcement (on page 852) of the new Covent Garden Opera scheme it seems that Broadcast opera from studios will soon be a thing of the past, apart from occasional broadcasts of new settings of old works appropriate to studios. The B.B.C. has long felt that opera broadcasts at its best from the actual opera house. The scheme assures the continuance and extension of the Covent Garden seasons, combining increased opportunities for the public to attend first-class performances of grand opera with adequate provision for those who, unable to attend the performances, are anxious to hear the broadcasts in their own houses.

ABOUT DICK SHEPPARD

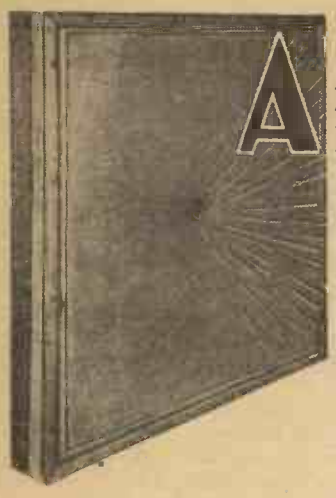
FOLLOWING Mr. Maxwell Light's deputy talk on asthma last Sunday, in which he mentioned that the Reverend Dick Sheppard was unable to give the talk owing to a crippling attack of asthma, hundreds of anxious inquiries were received from listeners. The B.B.C. wishes to reassure them that Dick Sheppard's indisposition was only temporary, although extremely exhausting, as asthma sufferers will appreciate. It is hoped that this favourite divine will soon broadcast again

A. J. ALAN AGAIN

ANOTHER inimitable story will be broadcast by A. J. Alan on December 1 from the National and on December 2 from the Regional. The title of the story is "The Well." It is related that, while listening to a rehearsal of this story, at A. J. Alan's house, an amusing affair took place. It appears that A. J. Alan was "broadcasting" his story, by speaking into a microphone situated in a different room from whence the loud-speaker reproduction appeared. Finishing "The Well," he went on to tell a story about a man who had a pet fish that used to follow him about until one day it was accidently drowned, but before he had finished speaking through the medium of the loud-speaker he appeared in person before his astonished audience. They had been listening to the reproduction of a gramophone record!

A GOOD SPORT

WHEN Walford Hyden arrived in the B.B.C. studio to conduct his Chinese scena during a recent vaudeville programme he found that one of the singers had been taken ill. Noticing another artiste standing by for another item in the programme, Hyden said: "Do you sing?" "A little," was the reply. "Right. Will you help me out?" "Let's have a look at it." So they tried over the number on the piano. "Fine! By the way, who *are* you?" "Melville Gideon." "Well, you're a good sport!" We wonder how many listeners to this particular item realised that only a "good sport" saved it.



A NOVEL LINEN-DIAPHRAGM SPEAKER

In the past we have described many linen-diaphragm loud-speakers all of which have been highly efficient. That described in this article, designed by W. A. HATCH, has several novel features and we place it before our readers with every assurance that it will give excellent results

THE big advantage of the linen speaker is that it enables amateurs to get high-quality reproduction at low cost. Furthermore, the amount of constructional work involved in the building of a linen speaker is so small that anyone capable of using ordinary wood-working tools should have no difficulty in making a very satisfactory job.

Moving-coil and dynamic speakers have their respective advantages, and the home construction of the former type, at least, is within the bounds of possibility. What deters amateurs, though, is the prospect of having to wind large "pot" coils, construct delicate moving-coil formers, and carry out rather tricky work at the diaphragm apex.

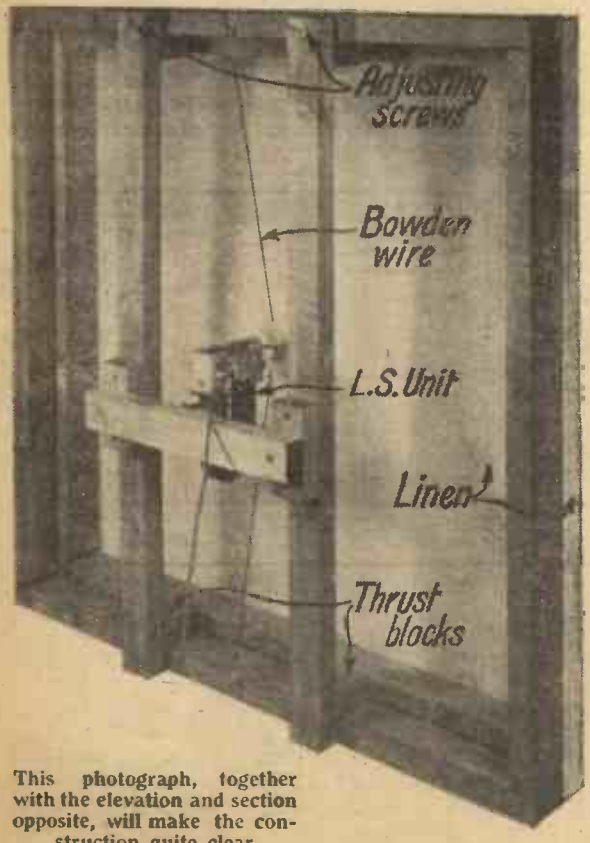
No such difficulties have to be contended with in the construction of a linen diaphragm speaker. Readers who have previously made up linen speakers will know that the principle of operation depends on the stretching of a linen sheet, rendered taut by "doping" with some cellulose compound, so that the natural period of vibration is shifted to a point of no importance on the frequency scale.

With some instruments the tension on the diaphragm is obtained by means of a smaller diaphragm, also of doped linen, the two being joined at their apexes. In other designs the smaller diaphragm has been dispensed with and the tension obtained by means of a run of stranded Bowden wire stretched tightly on the framework at the back and joined at its mid point to the apex of the diaphragm.

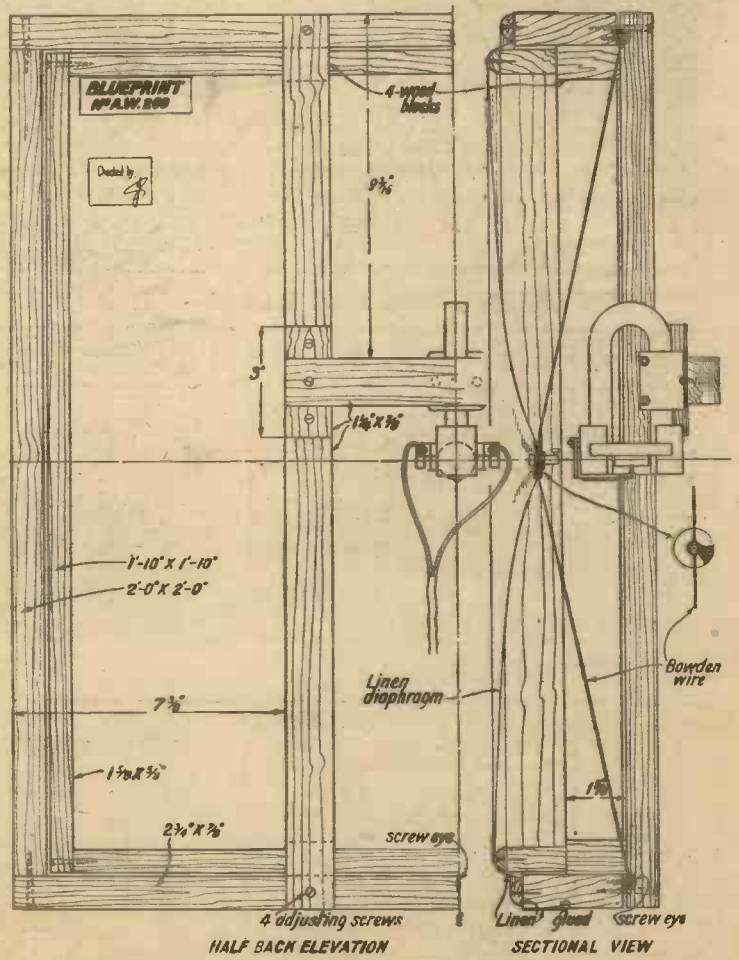
The degree of success obtained with a linen speaker depends very largely on correct tensioning. If the method of tensioning is not properly arranged, or if the dope used is of an inferior quality, not capable of tensioning the linen strands, then the diaphragm will be flabby and will not transmit sound vibrations over a useful portion of its area.

The new design of linen speaker shown here employs a novel method of tensioning.

(*Continued on next page*)



This photograph, together with the elevation and section opposite, will make the construction quite clear



A full-size blueprint of this drawing is available, price 1/-

"A NOVEL LINEN-DIAPHRAGM SPEAKER"

(*Continued from preceding page*)

It is still necessary to use the proper dope in order to get good results. No method of stretching can compensate for imperfect tensioning, by the dope, of the individual strands of the linen. In this new speaker the Bowden wire system of tensioning the diaphragm is employed, and the novelty consists in the way in which the diaphragm is stretched at its outer edges.

Examination of the constructional diagram given here shows that the linen diaphragm, which is firmly secured to a rectangular wooden frame, is stretched by means of an inner frame pressing against the edges of the diaphragm and forcing it outwards. The centre of the diaphragm is held by means of Bowden wire to the outer frame. The wire used for this tensioning must have a considerable tensile strength, for if it is affected by the constant strain on it then the speaker will be constantly needing adjustment and the diaphragm tensioning screws will need frequent attention. It is important, also, that the wire used for tensioning should not vibrate of its own accord, for were it to do so a resonance would be set up which would nullify the good frequency characteristic of a tightly-stretched diaphragm.

The novel tensioning system can clearly be seen in this photograph

Bowden wire is very suitable; use the kind covered with a protective compound, which has a deadening effect on any resonance which the stranded wire alone may exhibit.

The Linen

Practically any type of unit may be employed, but naturally only the best results can be expected with a driving mechanism capable of standing to quite a considerable amount of volume, and at that point showing no signs of overloading.

Complete kits of materials for making up this speaker can be obtained from specialists in linen speaker construction; the Kone-Dope Co., for example. If you are purchasing your own linen, then take care to get material of good quality, which will not burst its threads when the tensioning is being carried out.

Good quality Irish handkerchief linen is the proper material to use. It is unfair to expect good results from a diaphragm made up from poor linen.

The Framework

The frames can be constructed of any good hard wood and all measurements can be obtained from the accompanying drawing, which shows the speaker frames in part section. The outer frame is used as the support for the linen and the smaller frame is used for tensioning. It will be seen that the diaphragm is attached along its edges to the larger diaphragm with glue, and is further secured by means of stout beading, which should be screwed in place when the diaphragm has been stretched, evenly but not at drum tightness, across the frame.

The Bowden wire is secured at its ends by small screw eyes, the ends of the wire being twisted over and soldered. The connection to the chuck in the centre of the diaphragm can be made either by dividing the strands and pushing the chuck through, or, alternatively, a special chuck, supplied complete with the Bowden wire fixing, and which can be obtained from most wireless dealers, can be employed.

Doping

Doping and stretching should be carried out alternatively as with previous linen speakers. The final stretching should be carried out while the diaphragm is still wet with dope. As the fixing screws of the smaller diaphragm are tightened, the diaphragm is forced outwards, so increasing the tension on the Bowden wire. When the diaphragm is dry, it should be then at drum tightness and should emit a "plonk" when tapped with the finger.

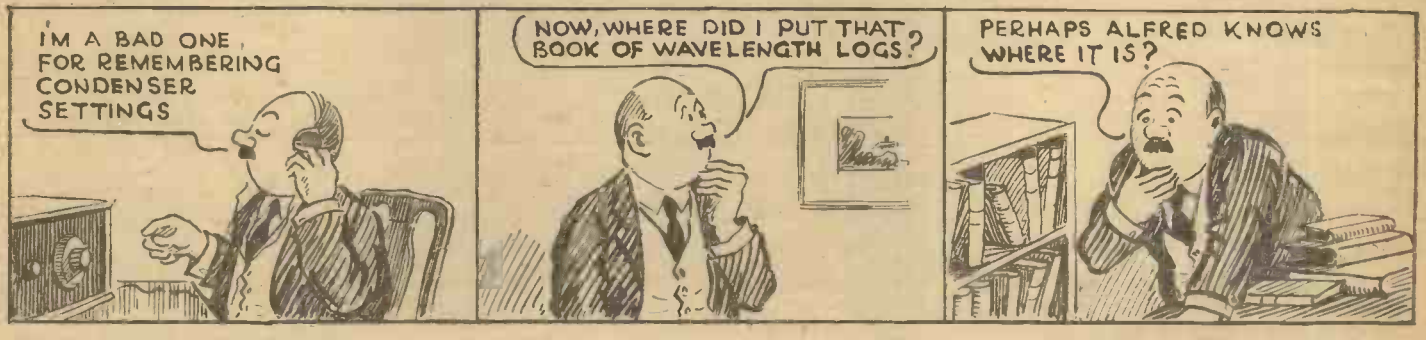
With some of the special linen diaphragms supplied by kit manufacturers, the tightening can be carried out simply by damping the diaphragm with water. When it dries, the tension of the threads is increased.

When fixing the unit to the diaphragm, take care to get the driving rod exactly central with the chuck in the centre of the diaphragm. If there is any eccentric strain on the driving rod, then the working of the unit may be upset, and in any case the diaphragm and driving mechanism will be acoustically damped by this side strain.

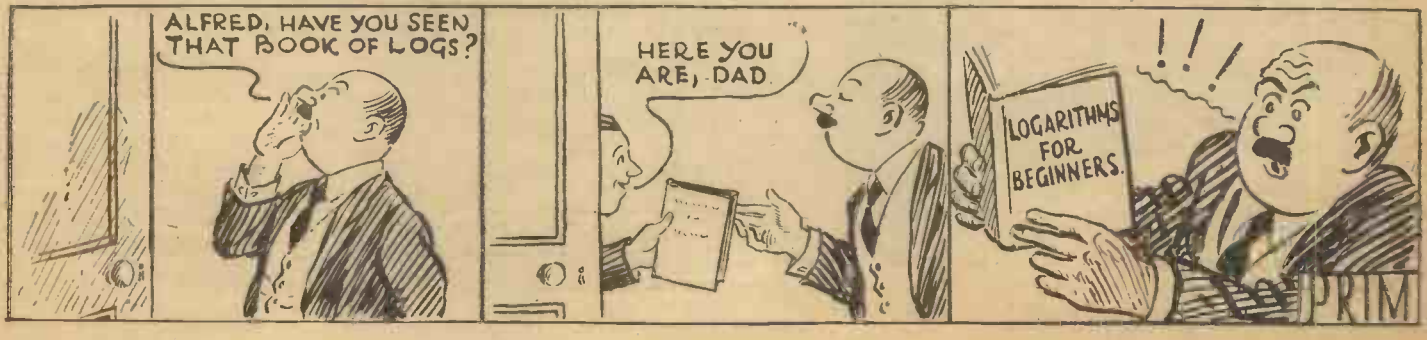
The unit must be very firmly secured to its supporting batten and the driving rod must be firmly attached to the chuck. Any looseness at either of these points may set up a disturbing chatter.

Constructors who want to make quite sure of getting good results and of eliminating any constructional difficulties should get the blueprint, which can be obtained, price 1s., post free, from the Blueprint Department of AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4.

MR. FLEX WANTS HIS LOG BOOK—



—AND GETS ALFRED'S



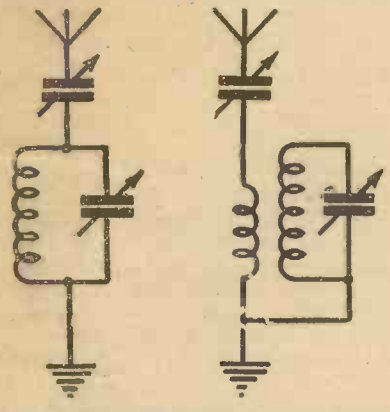
The NEWEST AERIAL CIRCUITS

Some notes on the best methods of obtaining selective tuning

By W JAMES

AT last it is being realised that from the local station we may receive several volts across the aerial tuning coil. Voltages of 6 are common, given an outdoor aerial and a good coil.

Relatively few people receive so great a voltage, but even a volt or two is enough to upset many screen-grid valves. These valves, as normally used, simply will not deal properly with signals of a volt or more.



Figs. 1 and 2. These are two usual aerial circuits but neither is very selective

The result is that distortion is introduced in the very first stage of the set and the tuning is made flat.

Volume Control

With a correct volume control we could avoid these difficulties to an extent, but the best practice is first to select the signal and then to magnify it. With this arrangement the screen-grid valve is not likely to be overloaded and broad tuning and distortion are, therefore, minimised.

The usual aerial circuit, Fig. 1, or perhaps Fig. 2, is really not very selective. You may have a good coil and tuning condenser, but the fact remains that the shape of the tuning curve is not really satisfactory.

The local station comes through even when the circuit is tuned, perhaps, 40 or 50 metres off. It is, therefore, magnified along with the signal to which the circuit is actually tuned and interference results.

In the early days of broadcasting we used to employ two-circuit tuners (Fig. 3). The position of one coil relative to the other could be altered. We used a two- or three-way coil holder and plug-in coils, and pretty good selectivity was obtained—actually much better than with some of our present-day arrangements.

To adjust the coupling of the pair of coils for the best results at every wavelength and to keep the circuits in tune demanded a little patience. Nowadays the smallest number of controls must be used, and so the old method is not used.

Instead, we try and fix a value of coupling which will be fairly good over the whole tuning range. Sometimes we use a magnetic coupling and sometimes a condenser coupling, while it is quite possible to use a mixture of both.

In the coupled circuit having a magnetic coupling we may fit a small coil L (Fig. 4), and shield the pair of tuning coils.

With similar coils and tuning condensers one knob tuning is practicable. The only difficulty is that if the size of L is made most satisfactory at 500 metres, the circuit is too tightly coupled at 200 metres and broad tuning results. If, on the other hand, the coupling is fixed at 200 metres, the circuit as a whole is far too sharp at 500 metres.

We can of course, obtain an average result by setting the circuit at, say, 350 metres, depending upon the kind of coils used and how their resistances vary with wavelength.

Condenser Coupling

When a condenser is used as the coupling, as in Fig. 5, the reverse tuning characteristics are obtained. Thus, if we set the condenser for the best results at 500 metres, the tuning is probably too sharp at 200 metres. We must remember, however, that an ordinary tuned circuit tunes more broadly at the lower wavelengths. It is, therefore, possible that the combined tuning of a set may be perfectly satisfactory and, so long as the characteristics of the aerial circuit are reasonably good, the method is suitable. The best value for the coupling condenser C depends upon the wavelength range being covered and the characteristics of the coils. A usual value with 2-in. coils of No. 26 or No. 28 wire, covering 200 to 550 metres, is .015 microfarad.

With a larger value the tuning is sharper, and if a lower capacity is used, the aerial circuit tunes more broadly. Thus there is room here for experiment and it might even pay to have a second condenser to switch in over part of the tuning range in order to secure the finest results.

Filter Circuits

Aerial filter circuits are greatly used in American sets, and as a rule they have good characteristics. They must of course, be carefully set up or the two circuits will not tune properly.

With the two condensers and coils matched, we have to adjust on the one hand for the effective capacity of the aerial and on the other hand for the capacity of the valve and its holder, to which must be added the wiring.

It is obvious that if, with both tuning condensers set at zero, the total capacities of the circuits are alike, the circuits will tune properly, because at any point over the range the capacity in both circuits is equal.

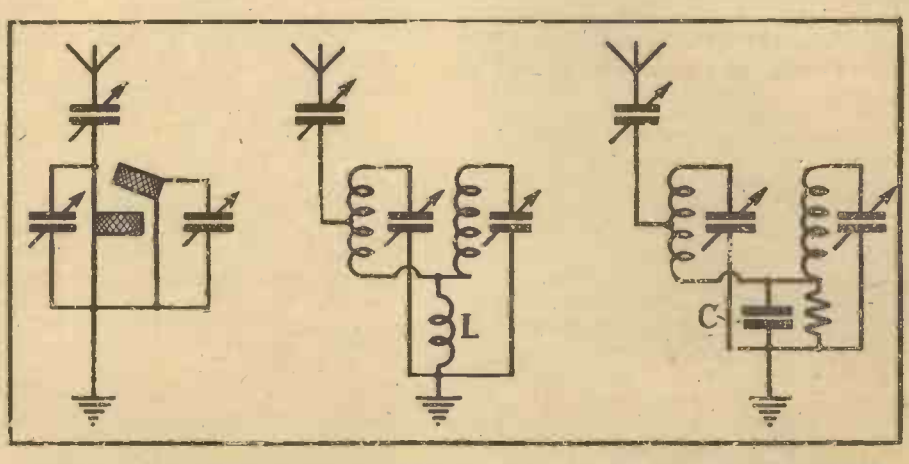


Fig. 3. An early double-tuner arrangement. Fig. 4. A coupled circuit with magnetic coupling. Fig. 5. A coupled circuit with condenser coupling

Perhaps the easiest way of testing is with a meter in the anode circuit of the detector valve. With a leaky-grid detector the meter will read less current when a signal is tuned in, and when the anode-bend method of detection is used the current increases with a signal.

Tune to the local station first and adjust the pre-set condenser in the aerial circuit

(*Continued at foot of next page*)

A HOME-MADE PICK-UP

MOST amateurs have all the necessary "ingredients" for the making of an excellent pick-up lying among the junk in their possession, only waiting to be assembled and put into commission.

For the pivot bar use the third contact stud (5BA this time to reduce weight) and, after cutting to the correct length to pass between the pivot points, slightly countersink both ends dead centre.

20 gauge, cut to cover both pole pieces and drilled in the centre to take the brass tag (D). Take a little care in assembling these parts in order to get the armature exactly over the pole pieces and parallel

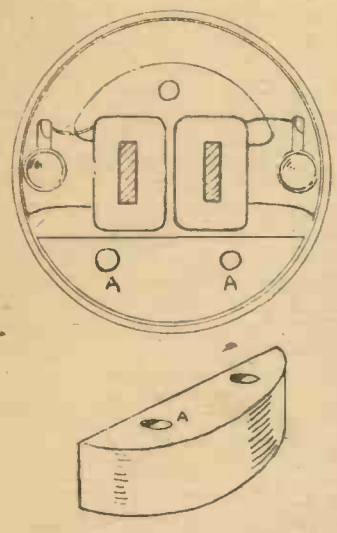


Fig. 1 (left). The earpiece and block

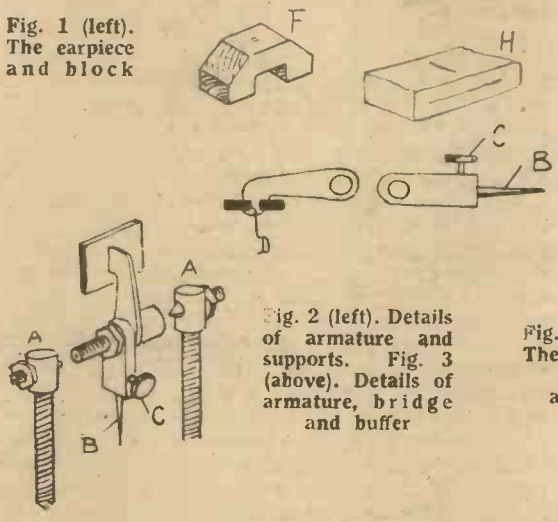


Fig. 2 (left). Details of armature and supports. Fig. 3 (above). Details of armature, bridge and buffer

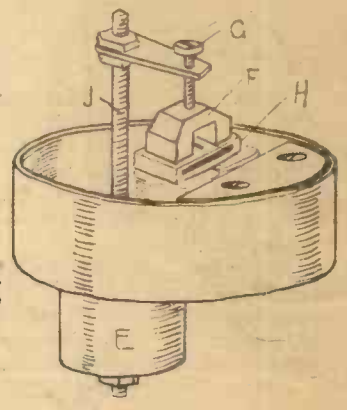


Fig. 4 (right). The pick-up partly assembled

You will need nothing but a single earpiece from a pair of headphones, three contact studs, some small pieces of wood, brass and iron, a piece of rubber sponge, and a few odd screws and nuts.

The principle used in the pick-up to be described is that used on the ordinary gramophone sound-box, the only alteration being the substitution of the light iron armature for the mica diaphragm.

Detach the earpiece and remove the cap and diaphragm. You will find that, apart from the pole pieces in the centre, one-half of the aluminium casing is unoccupied. Cut a piece of hard wood to fit snugly into this space (Fig. 1), the level of the small platform thus formed being brought to the height of the pole pieces. This block forms the anchorage of the mechanism operating the small armature.

Through both block and casing drill two 4BA clearance holes to accommodate two 4BA contact studs (A) about ¾ in. apart and parallel with the pole pieces. After tapping a 6BA thread through their heads (Fig. 2), insert the two contact studs and pull down tightly by means of nuts behind the casing, taking care to have the threaded holes in direct line. Two 6BA screws pointed at one end, and complete with lock nuts, are now inserted, points inwards, and we have everything in readiness for the moving parts.

Now study Fig. 2, and it will be seen that, while the brass needle holder has to be of sufficient substance to take both the hole for the needle (B) and that for the anchor screw (C), the small bar carrying

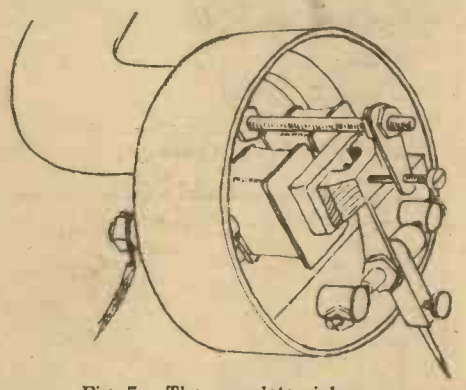


Fig. 5. The complete pick-up

the armature is much lighter, as it is here we have to keep down the weight. This bar must be of such a length that the armature shall be immediately over the two pole pieces (Fig. 4). File the end of the brass bar as shown in Fig 3, leaving a small tag (D) for riveting on the armature. Both bars are now drilled to fit on to the pivot bar and screwed up tightly.

The armature is of soft iron, about

to their surface when about ⅛ in. away from them.

If the movement is now assembled at the pivot points it will be found that, while the whole mechanism works freely, there is nothing to prevent the armature leaving the magnets. This must be kept close, at the same time leaving play for the movement to operate.

Here we kill two birds with one stone, by fixing a piece of 4BA rod through the other half of the casing J, one end holding a wooden boss E for inserting into the tone arm of the gramophone, while the other end holds the movement in place.

For this I have used a wooden bridge F, the size of the armature, held in place by an adjustable 6BA screw G in a small brass plate at the top of the rod. This bridge, which must clear any moving part, presses on a rubber sponge buffer H, and as the sponge is cut to envelop the iron it will be seen that not only is the movement held in place, but that a most useful damping adjustment can be made at the screw G. Cut the rubber sponge with a sharp chisel.

The pick-up is now complete and, provided all nuts are well tightened up to prevent undue rattle, you can fix the unit to your gramophone and connect up to your set.

C. H. SHARKE.

"THE NEWEST AERIAL CIRCUITS"

(*Continued from preceding page*)

Afterwards, tune to a fairly strong distant station and once more adjust the pre-set condenser to obtain good tuning.

A point to note now is that with the setting of the pre-set condenser found in this way the signal strength may not be the maximum. To try this, increase the capacity of the pre-set condenser a little and also that of the trimming condenser connected across the second tuning condenser, that is, the one joined to the grid of the valve. In this way the circuits will be kept in tune and the strength of the signal will be varied.

It is most important that the tuned circuits be properly ganged, and this can hardly be carried out unless a system is used. To adjust the trimming condensers without method will only end in confusion, and I believe the poor results sometimes obtained from a filter circuit are due solely to the circuits not being carefully ganged.

The Scottish Orchestra is again to broadcast a number of its concerts during the season. The arrangement includes the stipulation that a certain number of contemporary Scottish works will figure on the programmes

For all round service in a domestic receiver, the combination of a screened grid high frequency amplifying valve, a detector and a pentode output valve cannot be bettered. In a correctly designed receiver, these three valves give results definitely superior to the best 5-valve set of a few seasons ago, from the point of view of range, sensitivity and quality—and for a very much lower expenditure of both low and high tension current.

Such a combination, even in the hands of the merest novice, should render possible the reception, at good speaker strength, of a reasonable number of foreign transmissions as well as the local stations.

The following types should be employed in a screened grid, detector and pentode combination:—

L.T. Supply	Mullard Screened Grid	Mullard Detector	Mullard Pentode
2-volt accumulator	P.M.12	P.M. 2DX	P.M.22
4-volt accumulator	P.M.14	P.M. 4DX	P.M.24
6-volt accumulator	P.M.16	P.M. 6D	P.M.26
A.C. Main	S.4V or S.4VA	354V.	P.M.24 or P.M.24A

Mullard

THE · MASTER · VALVE

Advt.: The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.

Arks.

On Your Wavelength!

THE LOUD-SPEAKER TRIUMPHS

THE loud-speaker is gaining ground everywhere. Not so very long ago, musicians, especially those with "extremist" minds, looked upon the loud-speaker and broadcasting with suspicion and distrust. Sir Thomas Beecham said most unpleasant things about them. But the time has come when it is, in many cases, more satisfactory musically to sit at home and listen to a concert on a good loud-speaker than it is to go to the concert-hall. While it must be admitted that the loud-speaker does not put over the personal contact and personality of the artistes at the concert-hall, this drawback of not being able to see what is happening at the other end is frequently advantageous. Some of the finest vocalists, choirs, and orchestras are not very pleasing to look upon; and, again, many instrumentalists obtain effect —and subsequent applause—by means of physical flourishes and facial contortions.

HANDSOME CONDUCTORS

THE question of appearances works both ways, of course. Orchestral conductors are invariably aided by their personal appearance and the dignity which is inspired by command. Sir Thomas Beecham, Sir Hamilton Harty, Sir Henry Wood and others are good to look upon and fascinating to watch. But in watching them control their large orchestras, the eye is again taking the mind away from something which should be exclusively for the ear. When listening to the orchestra on a good loud-speaker, one is hearing it under conditions which permit concentration on the music itself, and, with the microphone placed ideally for picking up every instrument, the listener at home is frequently much better off than brother listener in the actual hall.

ABSORPTION

THE performance of a receiver in a town is usually much less satisfactory than the performance of the same receiver on an equally good (or bad) aerial in the suburbs or country. Quite apart from the question of local station interference, static and other noises, H.F. pick-up from distant stations is appreciably less. This is due to the screening effects and absorption of buildings, especially those with girders and metal frameworks.

RETAILED RADIO

THE plan of having a central receiving station and sending the radio programmes to subscribers by telephone line is spreading. There is a class of listener who does not want to be bothered with a receiving set however simple, and there are cases where acute local interference from trams, electric signs and the like make radio reception practically impossible. For these listeners the local broadcast suppliers are catering, and they provide their subscribers with a loud-speaker and switch; a broadcast programme is always on the line, in the same way as the distribution of broadcast music was made at the Radio Exhibition. Blackpool is the latest town to have such a central receiving station, and I hear that very fine results are being obtained. But if this practice spreads, the B.B.C. would do well to extend a little tactful aid to their self-appointed retailers. Badly designed receivers, with inadequate power stages and incorrect feeding of land lines will cause disappointment. The B.B.C. has done a great deal of work in this particular field, and the circulation of the design of their super Olympia receiver would protect listeners who wish to make use of this new kind of service. It should be added that a broadcast licence has to be taken out for each radio line used, so that the B.B.C. will lose nothing by the increasing use of "retailed radio."

FAULTY CONDENSER EFFECTS

THE most effective remedy for a broken condenser, of course, is to replace it with another one. The symptoms in a grid circuit, are no signals and failure to oscillate. It is perhaps a good thing when one finds a receiver not working properly to suspect some of the fixed condensers, perhaps replacing them with other ones in order to see if this clears up the difficulty. If the trouble still remains, of course, the condenser can be assumed to be O.K., but if there is a defect, then the substitution of another condenser will often cure the fault and save a good deal of bother.

"DUD" COMPONENTS

I WONDER if components to-day are really as reliable as we think they are. In the early days of wireless we often expected a component to be faulty. The wise birds would test all their parts before putting them in a set. To-day, owing to the great improvements which have been made, not only in methods of manufacture, but in the testing adopted by the manufacturers, before the products are sent out, we are inclined to take all components at their face value.

Nevertheless, cases do arise where trouble is experienced due to actual defects, and because of the state of mind into which we have allowed ourselves to be lulled, these defects are much more difficult to detect. Let me quote an instance which occurred only the other day when I was experimenting with a hook-up containing quite a number of valves. I was, in fact, trying out a little idea of my own. The preliminary experiments had worked out so well that I thought that it would perhaps be better if I built up the components more or less properly to avoid lots of straggly leads. This, by the way, is often a useful thing to do, partly because it shows definitely whether the effects being obtained are really due to the causes you imagine. If the same result is obtained when the set is wired up properly, then everything is in order, but if the results are much worse than they were in the hook-up stage, it shows that unsuspected effects were coming into play before, and one must, therefore, go back and find out what these effects were. It is only by proceeding in this manner that one can really determine whether any particular new stunt is of any value or not.

CAUGHT NAPPING

HOWEVER, when I built the arrangement up for the second time I found the results not just worse than they were before, but practically hopeless. I could get nothing through except the local station, and try as I would, the old liveliness had completely vanished. I searched everywhere for a cause, but I could hardly believe that the mere alteration of the layout had completely destroyed what had originally seemed a very promising hook-up. After considerable playing about I suddenly found that the grid condenser in my detector was not a condenser at all, but a piece of bakelite without any inside. I do not mean to say that there were no condenser plates at all, but that there was a complete disconnection internally. Replacement of this condenser certainly improved matters, but it did not altogether overcome the difficulty, and I therefore had to resume my search. Strange as it may seem I subsequently found *another* fixed condenser in exactly the same condition. Two completely broken fixed condensers in one hook-up is rather an extraordinary state of affairs, and I must admit that it was the first time it had happened in my experience for some considerable period. At the same time I have had trouble with fixed condensers before, which goes to show that, particularly in these days of cheap construction, errors in assembling may creep in, and defective components may pass the test bench.

OUTWARD APPEARANCES

I HEAR a certain amount of criticism levelled from time to time against the designers of sets for their apparent lack of artistic inspiration in the matter of "externals." Certainly many of the sets now on the market do strike a dead-level of mediocrity as regards outward shape and size. This is a drawback to those—especially the ladies—who feel that an obvious "box of tricks" is somewhat out of place in the living-room. In the case of loud-speakers, designers seem to be able to give their imagination freer rein. One can buy a speaker disguised as a hanging picture or wall-plaque, or even as a lampshade.

On Your Wavelength! (continued)

But a set is always the same old brick-shaped piece of work. I know of more than one instance where a harassed pater-familias has been compelled by "she who must be obeyed" to hide the wretched thing behind a screen, out of sight. Only by doing so could he preserve the harmony of the furniture, of the B.B.C., and of domestic life. Now, perhaps, the manufacturers will sit up and take notice.

SPLENDID CONDITIONS

AT the time of writing, conditions for receiving foreign stations are, and have been for some days, just about as good as I have known them at the time of year. The receiving set seems absolutely alive, and if you have one decent stage of high-frequency amplification, there is hardly a tick on the dials that doesn't bring in something. Atmospherics are conspicuous by their absence, except at rare moments, and there is undoubtedly far less morse interference on the broadcast band than there was even a year ago. This is generally speaking, for there are evenings when spark morse is a perfect nuisance for considerable periods. The other night our old friend, FFB, using the flattest tuning that I have ever come across, was messing up the patch of the broadcast band which contains some of the best received European stations. Sometimes, too, sparks spoil one's reception of Budapest and Vienna.

SOME NEW STATIONS

THERE are some fine new stations in operation on the broadcast band just now which the DX-minded reader should certainly look out for. Two of the best are Genoa and Strasbourg. Genoa has been working lately on a wavelength of about 312 metres—just above Cardiff—and he comes in with something like the punch of Turin. Strasbourg is supposed to have a wavelength of 346 metres, but when I found him the other night he was operating above 370 metres. You cannot mistake Strasbourg, for all announcements are made first by a woman in French and then by a man in German. Both Genoa and Strasbourg are at work on Sunday evenings during the close time of the home stations, and you shouldn't, therefore, have much difficulty in finding them. Strasbourg is a PTT station. Genoa, like Turin, relays the Milan programmes. These, by the way, are jolly good, particularly on Sundays.

WHAT A PIONEER SAYS

AN exceedingly interesting article by Sir Ambrose Fleming, the inventor of the diode valve, appeared the other day in one of the lay papers. The subject was the progress of wireless in 1930. Sir Ambrose dealt first of all with the big improvements in selectivity that had been made, and referred particularly to the Stenode, in which he sees the solution of one of the greatest problems of television. With ordinary receiving gear and sideband ideas of wireless, one of the difficulties about television is that the transmission of any but the smallest image will necessitate the use of a channel from five to ten times as wide as that allowed to any broadcasting station under the present wavelength plan. With the Stenode no trouble results, and large images can be transmitted and received without there being any interference with stations working on frequencies as near as 5 kilocycles on either side of the television station.

A VALVE SUGGESTION

I WAS wondering the other day whether it would not pay valve makers to grade their products. You will see what I am driving at in a moment. Supposing that you are buying a fixed condenser by a first-rate firm, you will probably purchase one of ordinary quality whose capacity is guaranteed to be within 5 per cent. of the stated value. Standard quality fixed resistances, again, are guaranteed accurate to within 5 per cent. Thus, if you pay five shillings for a wire-wound 50,000-ohm resistance made by a reputable firm, you know that its value lies between 47,500 and 52,500 ohms—limits which are quite near enough for ordinary purposes. But if you want a condenser or a resistance accurate to 2 per cent., or even 1 per cent., you can obtain these by paying a little extra for them.

Now for valves. I would like to see these classed in much the same way. The tolerances allowed in the impedance, amplification factor, and mutual conductance by valve makers' test departments are small. They are on a par with the 5-per-cent. accuracy of resistances. In the ordinary way, the very slight differences between one valve and another of the same make and type are so small that they do not affect the working of a receiving set. But in very sensitive high-frequency circuits, or in low-frequency circuits designed for special purposes, one does sometimes require valves either to match one another or to show none but the most minute divergencies from standard curves and figures. What I would like to see, then, is a standard-grade valve sold at the present price, or perhaps a little less, and a precision valve of guaranteed close accuracy sold at, say 25 per cent. more.

TROUBLE-SAVING

I BELIEVE that the precision grading of valves would pay makers well, and it could be quite easily carried out. It would mean simply that in the test department any valve which showed characteristics identical with the standard, or only minutely different from it, would pass into the precision class, whilst others with slightly greater variations would be graded as of standard quality. This kind of thing would be a very great saving of time and trouble to experimenters who wanted to match valves accurately. As matters are, it is often a lengthy and fiddling business to do so—and an expensive one. You must have a pretty large stock of valves and you have to go through them with the utmost care until you find a pair that are identical or almost so. Matched valves are becoming more and more in demand, since, in the search for quality, push-pull low-frequency amplification is constantly adding to its adherents, and the push-pull method of detection has now many devotees. I am quite sure that there would be a useful and a growing market for precision valves.

THERMION.

Wireless on slow trains in Italy is being installed on the line between Rome and Turin. Earphones will be available to passengers at a small charge.

THE HOW AND WHY OF RADIO

XI—THE ABC OF LOW-FREQUENCY AMPLIFICATION

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

BETWEEN the detector and the output valve an intermediate valve is nearly always required. This is because the low-frequency voltage, separated by the detector from the high frequency of transmission, is not big enough to load the power valve,

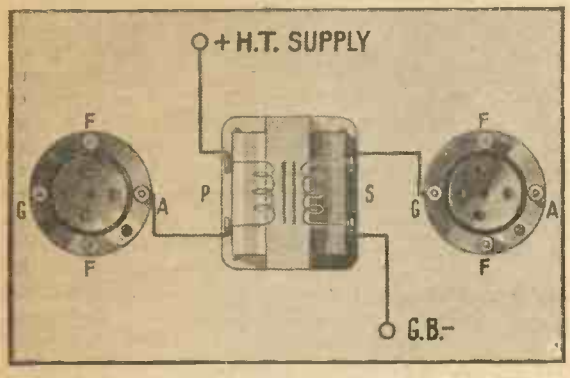


Fig. 1. Transformer coupling is the most commonly used type

which cannot, therefore, operate the loud-speaker.

Yet a study of the average three-valve set of to-day will not, at first, show the presence of a low-frequency valve. The first valve may be the high-frequency amplifier, the second the detector, and the third the power valve. Where, then, is the low-frequency valve?

The answer is that the detector and the power valve, in addition to their main functions, also work as low-frequency amplifiers. So much so that, with a suitable coupling between the detector and power valves, a further valve for the express

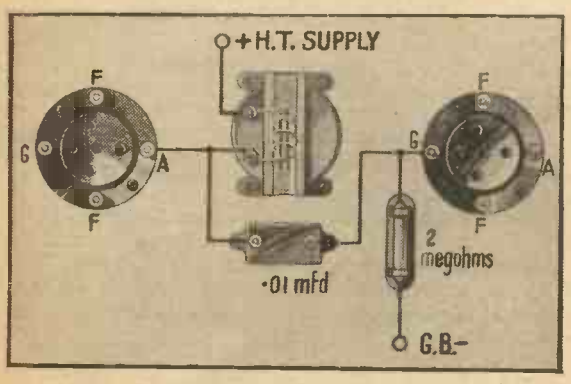


Fig. 2. The choke-capacity method does not give a voltage step-up

purpose of low-frequency amplification is often not wanted.

Before we talk about the different methods of coupling together low-frequency valves, let me emphasise two guiding rules. Firstly, we must ensure an even response curve. That is a technical way of saying that we must make sure that the output from the low-frequency amplifier is of the same form as the input, differing only in amplitude. At the input the high notes, middle register, and low notes will bear a certain relative prominence to one another. This same relative make-up of the musical scale should appear at the output. The job of low-frequency amplification is to amplify, not to modify. Sometimes the input is not pure, in that certain notes are unduly prominent. Only then can low-frequency amplification be allowed to distort the input, in order to overcome some initial and undesirable emphasis.

Firstly, then, an even response curve; secondly, to obtain even amplification, an observance of the impedance rule. The impedance in the anode circuit of the low-frequency valve must be not less than twice the impedance of the valve itself. Now the great difficulty about this rule is hardly ever referred to, but I intend to put beginners on their guard. It is all very well to say the impedance of the anode circuit must be twice that of the valve, but just what *is* the impedance of the valve under working conditions?

No amateur has any way of answering that question. The impedance of the valve is usually measured at zero grid volts and 100 anode volts. Assuming that the anode voltage actually applied to the valve is about 100 volts, one must think of the altered conditions brought about by the bias on the grid, often very different in value from the zero volts determining the nominal impedance of the valve.

In practice, the impedance of the valve is usually something greater than the value given in the maker's list of characteristics. By making the anode impedance three times the impedance of the valve, one can usually be sure that the impedance requirement for good quality is being observed.

Just what is this anode impedance?

It may be the primary of a transformer, a choke winding, or a non-inductive high resistance, depending on whether transformer, choke-capacity, or resistance-capacity coupling is employed. The transformer is by far the most used low-frequency amplifying coupling. Its simple connections, with the two valves it is coupling together, are shown by Fig. 1.

The primary winding forms the anode impedance of the valve preceding it. If the valve has an impedance of 20,000 ohms, the primary of the transformer should have an impedance of not less than 60,000 ohms, at a stated frequency. Here the beginner will again find a snag in relating theory with practice, for the transformers on the market are seldom accompanied by any useful data. Only a general rule can be observed to conform with the impedance

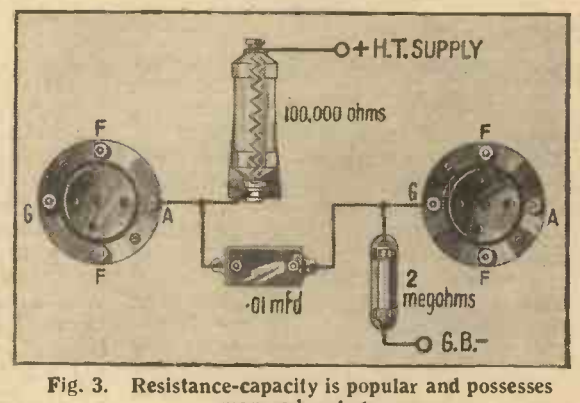


Fig. 3. Resistance-capacity is popular and possesses many advantages

ratio requirement.

This rule is based on a limitation common to all transformers, namely, that only a certain amount of wire can be used for the secondary, beyond which very bad effects are produced. So when a high ratio of secondary to primary turns is wanted, the primary is reduced, instead of increasing the secondary. The fewer the primary turns, other things being equal, the lower the impedance of the primary. So if a high-ratio transformer is used, in order to gain a big step-up in voltage, it is wise to choose a medium-impedance valve, say 20,000 ohms. A low-ratio transformer is more likely to have a high-impedance primary than one with a high ratio. But with a good low-ratio transformer one can use a much higher impedance valve. And since a high-impedance valve usually has a high amplification factor, it greatly offsets the disadvantage of the low ratio.

(Continued at foot of next page)

ALL ABOUT B.B.C. AUDITIONS

By SAVOY HILLER

Auditions are usually given in either No. 4 or No. 8 studios. This is a photograph of No. 8

THERE are, of course, several varieties of auditions at the B.B.C.—vaudeville, dramatic, instrumental, musical comedy, operatic and concert, and even talks.

Each of these sections is run by a different department and each body of officials responsible for auditions is allowed to use its own method of procedure.

Let us take vaudeville, for example. The B.B.C. is only too willing to give every applicant an audition, but such applicant must have what is known on the music hall stage as "an act."

It is not a bit of good just saying, "Oh, I sing comic songs," or, "My partner and I do cross-talk" your work must have been properly rehearsed and arranged into a five-, ten-, or fifteen-minute item.

Originality Necessary

Once you can show that you have got something like this, the B.B.C. will at once give you an audition, and if you do well, you are more than likely to get dates.

Of course, it is not easy for a new "act" to, shall I say, get away with it, because to be successful you must have something about you which is different to anyone else. Imitation, although the sincerest form of flattery, is no use. You must remember that the B.B.C. has the services of a great many stars already.

As an example: suppose you are a guitar player—well, it is not a bit of good just being a good player. You must have originality or personality or new method to "put it over." You see, the B.B.C. already has Mario de Pietro and his guitar playing is just about the best in the country.

Vaudeville auditions are run under the following system. A studio is connected via the microphone to a listening room in another part of the building, where sit one or two experts. As soon as everything is ready, the first "turn" is shown in and another official in the studio announces to the listeners that, "No. 1—a comedian—will sing."

Judged on Capability

During and after No. 1's performance, the listening experts make notes independently of each other for comparison later.

After No. 1 comes No. 2—a xylophone player, for instance—and so on for perhaps a dozen different tests.

You see, the advantage of the listening room is that the auditors, as we might call them, never *see* the artistes, so that everyone is judged by their broadcasting capabilities only, appearance, bad or good, not entering into it at all. As well as making notes on performances, the listening experts also each jot down their opinion as to an artiste's worth in guineas, so that when the verdicts are compared later, the booking manager can get some idea as to what amount to offer them.

I am sorry to say, however, that the percentage of successful auditions is depressingly low. Last year only one per cent. passed the tests.

Dramatic auditions, or auditions for play-acting are also conducted by means of a listening room. In this case candidates are required to read a few lines from a chosen play, recite a little poetry, do something from Shakespeare (this is optional), and give a reading from a daily newspaper. If, of course, they should know languages or dialects, they are allowed to render a passage or two from these, also.

A Committee of Experts

Now that the B.B.C. has a repertory company for plays, however, there is not much call for outside talent in dramatic work.

Vocal and instrumental auditions for orchestral, concert and, operatic work are held by a committee of experts and in the listening room there are often as many as eight or nine persons "taking" an audition.

The biggest bug-bear in vocal auditions is, of course, "wobble," or more technically, "vibrato," and any one with the slightest trace of it has little chance of success.

Of course, hundreds of artistes who have not passed these tests are still wondering why, because the B.B.C. never gives a reason for failure, being content with the words: "We regret to inform you that your voice was not considered suitable for our 'medium' (microphone)," or something equally non-committal, but in my opinion, and I have attended many auditions at Savoy Hill, in the capacity of spectator of course, the B.B.C. system represents fairness itself; and as for the studio officials who conduct the tests in the studios, they are the last word in courtesy.

"THE A B C OF LOW-FREQUENCY AMPLIFICATION"

(*Continued from preceding page*)

In the choke-capacity method of coupling there is no step-up in voltage. The overall amplification of a stage of choke-capacity coupling, as shown by Fig. 2, cannot be greater than the amplification of the first valve, and in practice is always less. Variations in this method of coupling provide for a step-up in voltage by tapping the choke coil. This system is now seldom used, but the third form of coupling, shown by Fig. 3, is still a good second to transformer coupling. This is the resistance-capacity coupling, widely adopted to ensure good-quality amplification. But that was before the existing high-quality transformers were available.

In resistance-capacity coupling it is easy to conform with the impedance rule already mentioned, because there is no difficulty in making a high resistance free from unwanted capacity effects. The value of the resistance should be not less than three times the valve impedance. And that value determines the value of the coupling condenser and grid leak.

We have so far been dealing with the low-frequency valve preceding the coupling, but we must end these notes by a reminder that the power valve following the coupling is also a low-frequency amplifier, subject to the same impedance rule as applied to the preceding valve. In the anode circuit of the power valve is the loud-speaker. Its impedance should be greater than the impedance of the valve, or at any rate not less.

Sometimes the impedance of the loud-speaker differs so much from the impedance of the power valve that the two can only be reconciled by using an output transformer, the primary matching the valve impedance and the secondary matching the impedance of the loud-speaker.

HOTSPOT.

THREE NEW MARCONI VALVES!

COMPLETING A WONDERFUL 2-VOLT SERIES!

S2/c

A new screen grid valve which at last provides, in perfectly blended unison, every feature required in the ideal H.F. amplifier. Marconi S2/c combines a very high amplification factor with very moderate impedance; enormous magnification is thus easily obtainable in any receiver; at the same time the minute self capacity ensures perfect stability. Rigidly constructed and unvarying in characteristics, S2/c will set new standards in successful H.F. amplification **20/-**

L2/b

Remarkably high mutual conductance—1.55 MA/volt—excellent amplification combined with particularly fine reproduction—these are outstanding points in the performance of Marconi L2/b, a new 2-volt low frequency and general purpose valve of exceptional efficiency. L2/b is a sensitive heavy duty detector, and a supreme initial L.F. amplifier; its low impedance permits of perfect reproduction with transformer coupling, the very high stage gain greatly increasing the overall efficiency of any receiver. **8/6**

P2/b

A new 2-volt super power valve of amazing efficiency with characteristics superior to those of any equivalent 6-volt type—truly a crowning achievement of Marconi research! Marconi P2/b successfully unites a high amplification factor with the low impedance of only 1,850 ohms, a figure ideally suited to the average cone or moving coil speaker. Exceptionally steep slope renders it the foremost output valve for every battery operated receiver in which ample volume, pure tone and strict economy in current must combine for perfect reception. **13/6**

CHARACTERISTICS.	S2/c.	L2/b.	P2/b.
Amp. Factor	330	15.5	6.5
Impedance	300,000	10,000	1,850
Mut. Conductance	1.1	1.55	3.5
Fil. Volts	2.0	2.0	2.0
Fil. Amps.	0.15	0.1	0.2
H.T. Volts—(max.)	150	150	150
Price	20/-	8/6	13/6

USE MARCONI VALVES

The Valves the G. Marconi Experts use!

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

THE RIDGEWAY PARADES

THE TALKS

AN extraordinary speech by Mr. Ridgeway, throwing bouquets at the B.B.C. through the B.B.C. microphone, concluded a series of mediocre productions. But Mr. Ridgeway apparently seems to be proud of them. Look how they were announced: "The Ridgeway Parade," "Including additional number by Philip Ridgeway," "Devised, written, and produced by Philip Ridgeway." But all this was not enough, apparently. Mr. Holt Marvel must come in to his aid.

◆ ◆ ◆

As I say, the funniest part of the production was the speech, which apparently was *not* censored. Reminded me of the sort of thing that goes on on the boards, where hysteria seems to be part of the show. "I love you all, my lovely audience!"

◆ ◆ ◆

The next series of talks, "Electricity in Our Bodies," by Mr. Bryan H. C. Matthews, bids fair to be interesting. Certainly the first one was arresting, if a bit gruesome.

◆ ◆ ◆

The St. George Singers may be good; but, oh, the dreary stuff they sang!

◆ ◆ ◆

In the National programme I noticed that from 7 o'clock to 7.30 there was a talk on new novels, and when that was finished another talk until 7.45. This hardly seems to be a good arrangement.

Two good speakers, however, are Professor Ernest Barker, who spoke on "What is Liberty?" and Dr. J. B. Orr, who began a series on "The Future Supply of Animal Products."

◆ ◆ ◆

In regard to this last talk, supposing you had not read it was being relayed from Aberdeen, would you have guessed it?

◆ ◆ ◆

Holt Marvel is one of the most energetic and enterprising young men I know, but I think he will admit that *Give Me New York* is not the best of his productions. I really do not think it was worth £2 a minute. Why does not Mr. Marvel put over his musical plays based on the music of famous masters? At Savoy Hill, however, they tell me that his numbers in any show are the best. And *they* ought to know!

◆ ◆ ◆

I prefer the playing of the Luton Red Cross Band to their singing even as Persians. It didn't sound much like "A Persian Market," but rather like Club Row.

◆ ◆ ◆

I think we are getting to the climax of the annoyance of hearing Cockney singing during dance-band music. The latest 'orrible example was during the relay of Jack Kerr and his band from Birmingham. Apart from the fact that there was an "extra special request," there was another song about "seeing you dye by dye." I admit that "dye by dye" sounds better than merely "day by day"; but, then, this is contrary to the teaching of the B.B.C. official pronunciation, which in a moment of weakness I vowed to accept.

◆ ◆ ◆

I ought to make mention of *Brigade Exchange* since we are likely to have more war plays. Now, I submit that *All Quiet on the Western Front* and *Journey's End* told us the worst about war, and therefore a play like *Brigade Exchange* sounds rather tame. The little gadgets which were meant to freeze our blood had all been heard before.

◆ ◆ ◆

But I notice in this play a tendency to use a method (probably it was the same man) which is merely shouting—or no doubt the producer would prefer to use the word "declaim"—imagining that this is dramatic emphasis when it is merely irritating confusion.

Lissenden's idea of Archie Pitt

"GIVE ME NEW YORK"

DANCE BAND PLAYING

I may be wrong, but the same sort of man shouted in the same way in other productions, and I wish they would cut it out.

◆ ◆ ◆

By careful manipulation I switched on Midland Regional to hear an operatic programme from *Faust* by the Birmingham Grand Opera Society, but I am afraid the singing of Siebel rather broke one of the important tenets of the B.B.C. regarding *tremula*, and put me completely off.

◆ ◆ ◆

"The 1914-1918 Chronicle" was beautiful in conception, even if now and then the renderings seemed to be too sombre. It was a privilege to hear the best work from some of our best writers.

◆ ◆ ◆

I have often paid tribute to Joseph Lewis and his orchestra, and therefore I congratulate him, and London, on his promotion.

◆ ◆ ◆

Certainly the B.B.C. are getting away with it with their new symphony orchestra.

I paid another visit to the Queen's Hall. Although the programme was full of Bach, there was not a slackening of interest among the audience from beginning to end. Sir Henry Wood conducted, and, watching him, I thought: "How well this man is wearing!" When you are sitting in the hall, thinking back twenty-five years, when you saw him on the same platform, it makes you feel rather old!

◆ ◆ ◆

I listened, too, to the Sunday concert, and I think that both listeners and those who saw the concert are equally fortunate.

◆ ◆ ◆

I still seem to be out of luck whenever I switch on to the Saturday 1 till 2 o'clock programmes. What I heard last Saturday was a sort of jazzy riot, and in the past one had been accustomed to quiet music of the better sort.

And, by the way, the announcer in closing down corrected himself when he said the orchestra was "conducted by" Joseph Muscant. "Directed by" was his corrected expression.

Can anyone explain the difference between these terms beyond the possibility that ordinary orchestras have conductors and grand orchestras directors?

The SEARC SHO

By THE "A.W." TECHNICAL STAFF

IF you have not previously contemplated listening on the short waves, then now is the time to do so.

Short-wave reception conditions vary from time to time, just like their broadcast band counterparts, and all regular short-wave listeners are agreed at the moment that the present time of year is productive of a whole crop of short-wave stations easily receivable on simple sets at good speaker strength. Do not be deterred by friends who tell you that short-wave listening is beset by technical difficulties, that the results are not worth while, and that you will have to spend a deal of time in listening with phones.

These things are relics of a day when short-wave reception was not properly understood and before valves and tuning circuits were as efficient as they now can be.

It is quite possible to convert your present broadcast-band set to short-wave reception, but that is not always the most efficient way of going about the job. After all, there is little difference between making up a special set for short-wave reception and the construction of an adaptor unit to make your present set workable on the short waves. Both necessitate new parts and both are used with existing batteries and valves. You can use the valves, high-, low-tension, and grid-bias batteries, speaker, aerial, and earth as are employed for broadcast-band reception.

The set is arranged on straightforward and conventional lines, with a panel supporting the main controls, and a baseboard.

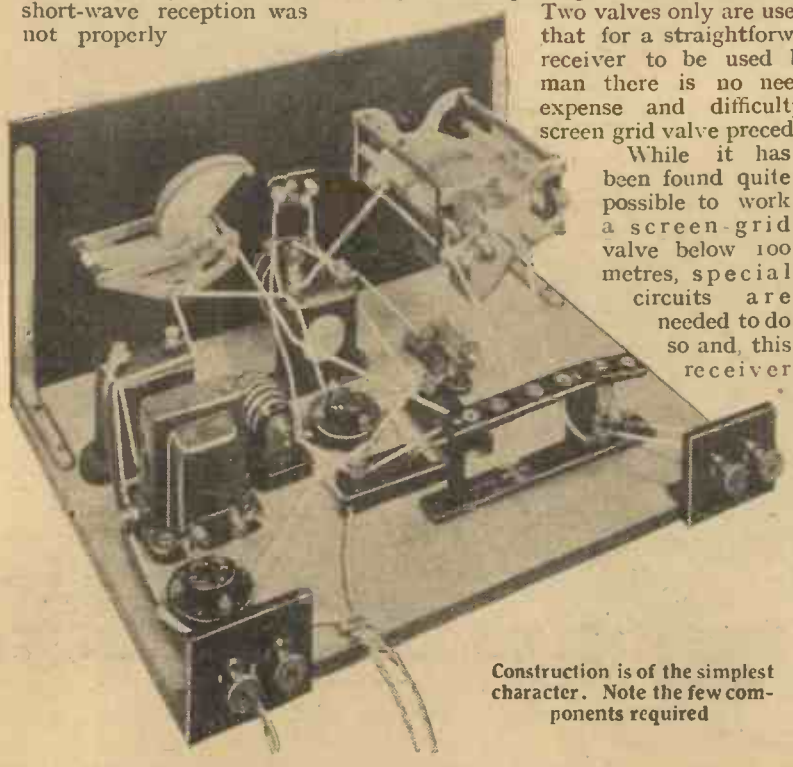
Two valves only are used, for it is felt that for a straightforward short-wave receiver to be used by the average man there is no need to go to the expense and difficulty of fitting a screen grid valve preceding the detector.

While it has been found quite possible to work a screen-grid valve below 100 metres, special circuits are needed to do so and, this receiver being mainly as a stand-by for occasional short-wave listening, the use of an expensive screen-grid stage would not be justified. For this set you just use your ordinary detector and power valves.

Do not think, however, that any feature has been overlooked which would appeal to the technical folk well acquainted with short-wave working. On the contrary, the AMATEUR WIRELESS Technical Staff has taken a deal of pains to make this two-valve short-wave set a real success and to ensure that it can be worked by novices and experts alike.

Novel Features

Short-wave connoisseurs will appreciate a novel idea which has been incorporated in the tuning circuit. If you have previously used a short-wave set, you will have noticed that, when searching below 50 metres or so, some condensers give rise to crackling noises in the speaker when the slightest variation in capacity is made. This makes tuning very difficult, of course, and rather unpleasant. Poorly-made condensers exhibit this fault on all short-wave reception, while others do not give trouble until the wavelengths below 50 metres, or thereabouts, are tried; but on



Construction is of the simplest character. Note the few components required

THE COMPONENTS AND THE CIRCUIT C

Ebonite panel, 14 in. by 7 in. (Becol, Trelleborg).

.00015-mfd. short-wave condenser (Cyldon).

Special .0002-mfd. reaction condenser (J.B, Lissen, Igranic, Readi-Rad, Dubilier, Burton, Polar, Formo).

Two slow-motion dials (Utility type W.181, Ormond, Igranic, Astra).

400-ohm panel-mounting potentiometer (Lissen, Igranic, Rotor, Varley).

On-off filament switch (Readi-Rad, Bulgin, Junit, Benjamin, Lotus, Lissen, Igranic).

Two anti-microphonic valve holders (Lotus, Telsen, Benjamin, Igranic, W.B., Clix, Wearite, Burton).

2-mfd. fixed condenser (Lissen, T.C.C., Igranic, Dubilier, Formo).

1-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Igranic, Formo).

High-frequency choke (Burton, Igranic, Lewcos, R.I., Lissen, Wearite, Varley, Telsen).

Two .0001-mfd. fixed condensers (Lissen, Telsen, Dubilier, T.C.C., Watmel, Formo, Igranic).

3-megohm grid leak (Dubilier, Lissen, Rotor, Igranic).

Grid-leak holder (Lissen, Bulgin, Wearite, Graham-Farish).

Short-wave inductance unit (Eddystone type 585).

Low-frequency transformer (Telsen Ace, Lissen, Igranic, Burton, R.I., Lotus, Varley).

15,000-ohm spaghetti resistance (Bulgin).

Two terminal blocks (Junit, Lissen, Belling-Lee).

Four terminals, marked: A, E, L.S.+, L.S.— (Eelex, Belling-Lee, Clix, Igranic, Burton).

Four wander plugs, marked: H.T.—, H.T.+, G.B.—, G.B.+ (Clix, Belling-Lee, Eelex, Burton, Igranic).

Pair panel brackets (Bulgin, Keystone, Readi-Rad).

Glazite for wiring.

Rubber-covered flex (Lewcos).

CHER ORT-WAVE TWO

There is no need to have anything elaborate for short-wave reception, and a glance down any official list of below 100-metre stations shows what a galaxy of transmissions there is now on the ether, and which is at the disposal of any amateur who is enterprising enough to make up a simple set for this special work.

25 metres and below it is safe to say that practically every condenser gives rise to these noises—not an inherent fault in the component itself, but one due to the fact that at these very high frequencies the slightest variation of capacity caused by the movement of a pigtail connection, or by a resistance change caused by the movements of the condenser, gives rise to crackling noises.

Special Tuning Arrangements

A special dual condenser is used in this short-wave set and a novel method of connection prevents this from giving rise to "atmospherics." You will see that the two sets of fixed vanes (the condenser has dual sections) are taken to the tuning points of the circuit and that the variation of capacity is produced solely by the movement of the two sections of the moving vanes.

A little thought will thus show that variation of capacity is produced not by any moving part in connection with the outside circuit, and there is, therefore, nothing to cause noisy working. Even when this set is worked down on 15 metres the condenser control is quite silent.

Other little features which will appeal to knowledgable short-wave enthusiasts are the inclusion of a grid-leak potentiometer, which gives a nice control of oscillation and keeps the detector at its proper working point, and the use of a dropping resistance in series with the detector anode; this is a sure guard against threshold howl.

You need have no worry on the score of expense, for the parts needed are few. A full list of components is given in an accompanying table.

You are advised to get the full-size blueprint which is available for this receiver, price, 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4, for accurate layout is of paramount importance in a "wavelets" set. The blueprint, which is full size, makes it easy for any constructor to follow the layout exactly.

You will see from the photographs that the layout of the set is well spaced. Care should be taken not to crowd the parts together, and the arrangement of the parts on the baseboard should be followed with meticulous care.

Easy Construction

Constructional work has been simplified by the use of flex connections for the high-tension, low-tension, and grid-bias batteries. Terminal strips are used only for the aerial and earth and the output to the speaker.

Panel drilling is quite a simple job, and the blueprint should be used as a guide to show the centres for the tuning and reaction condensers, the filament on-off switch, and the potentiometer.

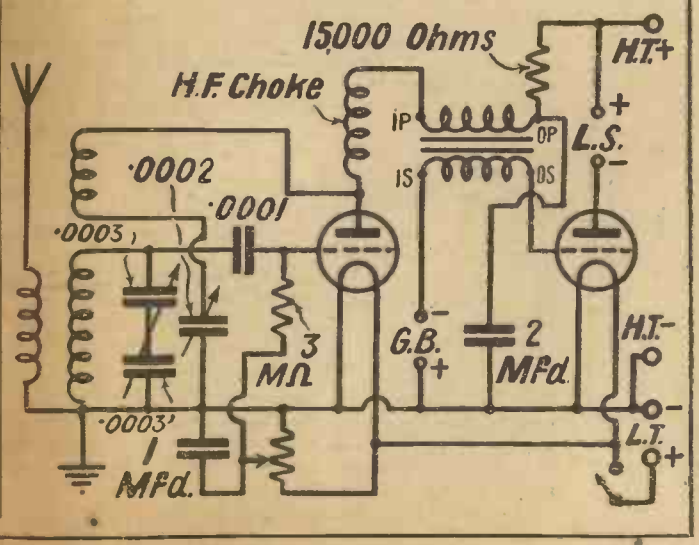
Do not mount these parts until the panel has been firmly fixed at right angles to the baseboard. Panel brackets are used in order to keep the panel rigidly at right angles, for any loose movement in a short-wave set is apt to make tuning difficult. For this reason the wiring should be carefully done and all the joints made so that a good electrical and mechanical connection is provided.

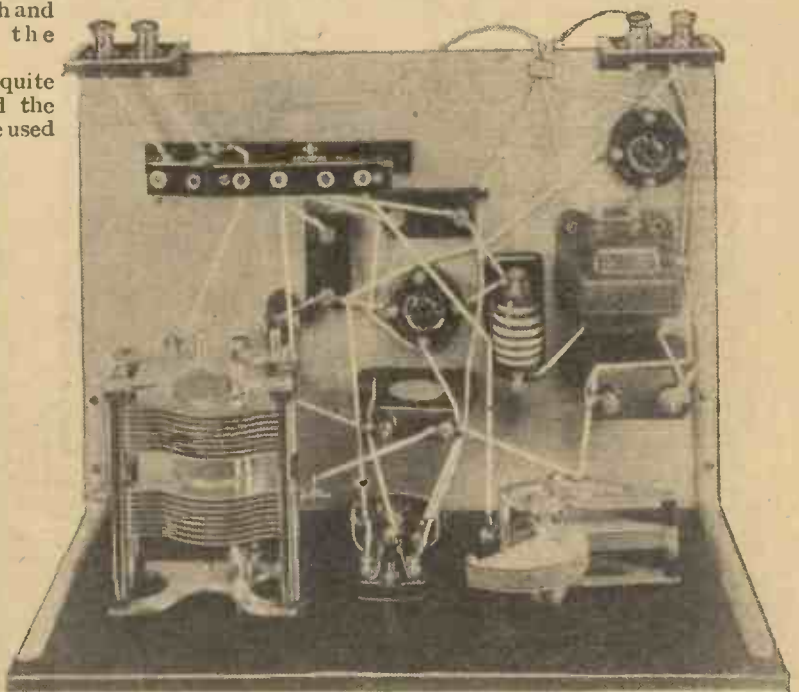
Rigid wire is used for making connections, except to those points to which the battery flexes are taken. The 15,000-ohm dropping resistance in the detector anode circuit is one of the new flexible resistances, and this is connected directly between high-tension positive terminal and one of the terminals on the 2-microfarad by-pass condenser. This condenser, by the way, should not be mounted until connections have been made to the low-frequency terminals, for otherwise a little difficulty will be experienced in soldering to the transformer terminal tags.

Make sure that you connect the coil supporting strip exactly as shown by the layout diagram. A special method of connections has been employed to work in conjunction with the novel condenser tuning arrangement.

In the set shown by the photographs the point-to-point wiring system has been adopted and soldered connections have been made. The point-to-point system is very

F THE "SEARCHER SHORT-WAVE TWO"





This plan view shows the easy wiring ; compare it with the layout diagram on the next page

convenient in this particular receiver, for it makes for short, direct connections and a minimum of internal capacity in the set. The appearance may not be so pleasing to the eye as that obtained by the square-corner system, but then we are out for the maximum of efficiency and "prettiness" must be a secondary consideration.

It should be unnecessary to emphasise the importance of making a test of the wiring when all the leads have been connected. There is nothing very difficult about this, the scheme of connections being so simple.

Suitable Valves

So far as valves are concerned, you will, in practically every case, find that standard detector and power valves are quite suitable, but if you are buying special valves for the set, then you will find the following recommendations helpful. The detector valve may be chosen from the following:

Two volts: Mullard PM2DX, Cossor 210HF, Dario Univ., Marconi HL210, Osram HL210, Six-Sixty 210HF, Mazda HL210, Lissen HL210. Four volts: Mullard PM3, Six-Sixty 4075HF, Osram HL410, Marconi HL410, Dario Univ., Cossor 410HF. Six volts: Mullard PM5X, Cossor 610HF, Marconi HL610, Osram HL610, Mazda HL607.

The power valve need not be of the super type, for it will not have to deal with large grid swings, and the following power valves will be quite suitable and will not consume an excessive amount of high tension:

Two volts: Mullard PM2, Cossor 220P, Dario SP, Marconi P2, Osram P2, Six-Sixty 220P, Mazda P220A, Lissen P220. Four volts: Mullard PM4, Cossor 410P, Dario SP, Marconi P410, Osram P410, Six-Sixty 410P. Six volts: Cossor 610P, Marconi P610, Osram P610, Six-Sixty 610P, Mullard PM6.

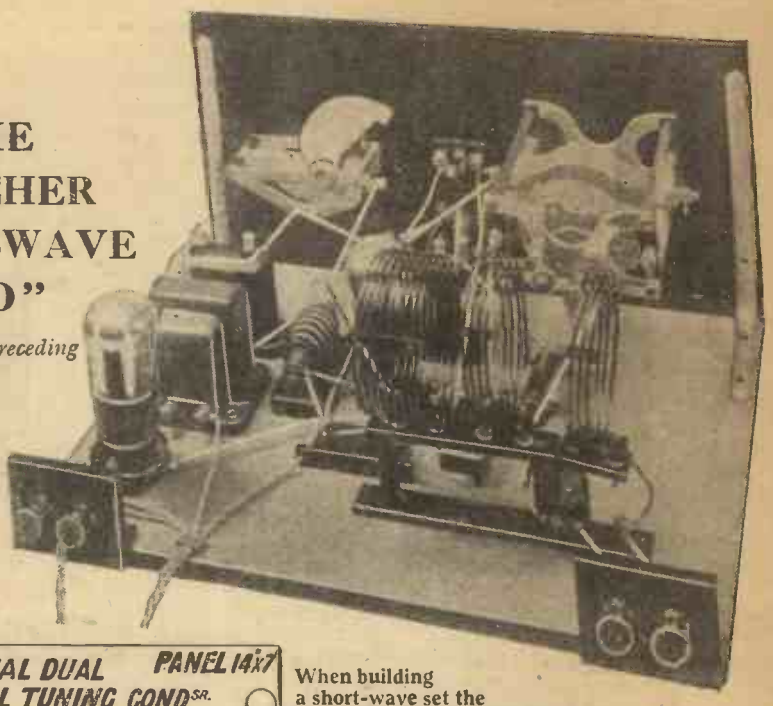
Proper use of the coils plays an important part in getting good results. With the standard Eddystone coils used it will be found that the lowest range, from 14 to approximately 31 metres, is covered by a 3-turn coil in the aerial socket, a similar coil in the grid socket, and a 2-turn coil in the reaction socket. The next range, from 25 to approximately 52 metres, is covered by a 3- or 6-turn coil in the aerial socket, a 6-turn coil in the grid socket, and a 3-turn coil in the reaction socket. A range of 46 to about 98 metres is covered by a 6-turn coil in the aerial socket, a 15-turn grid coil, and a 5-turn reaction coil.

There should be no difficulty in obtaining reaction. Various settings of the potentiometer and of the aerial coil with respect to the adjustment of the grid coil should be tried. If there is any tendency to motor-boat when the reaction condenser is adjusted, then a new setting of the potentiometer arm should be tried.

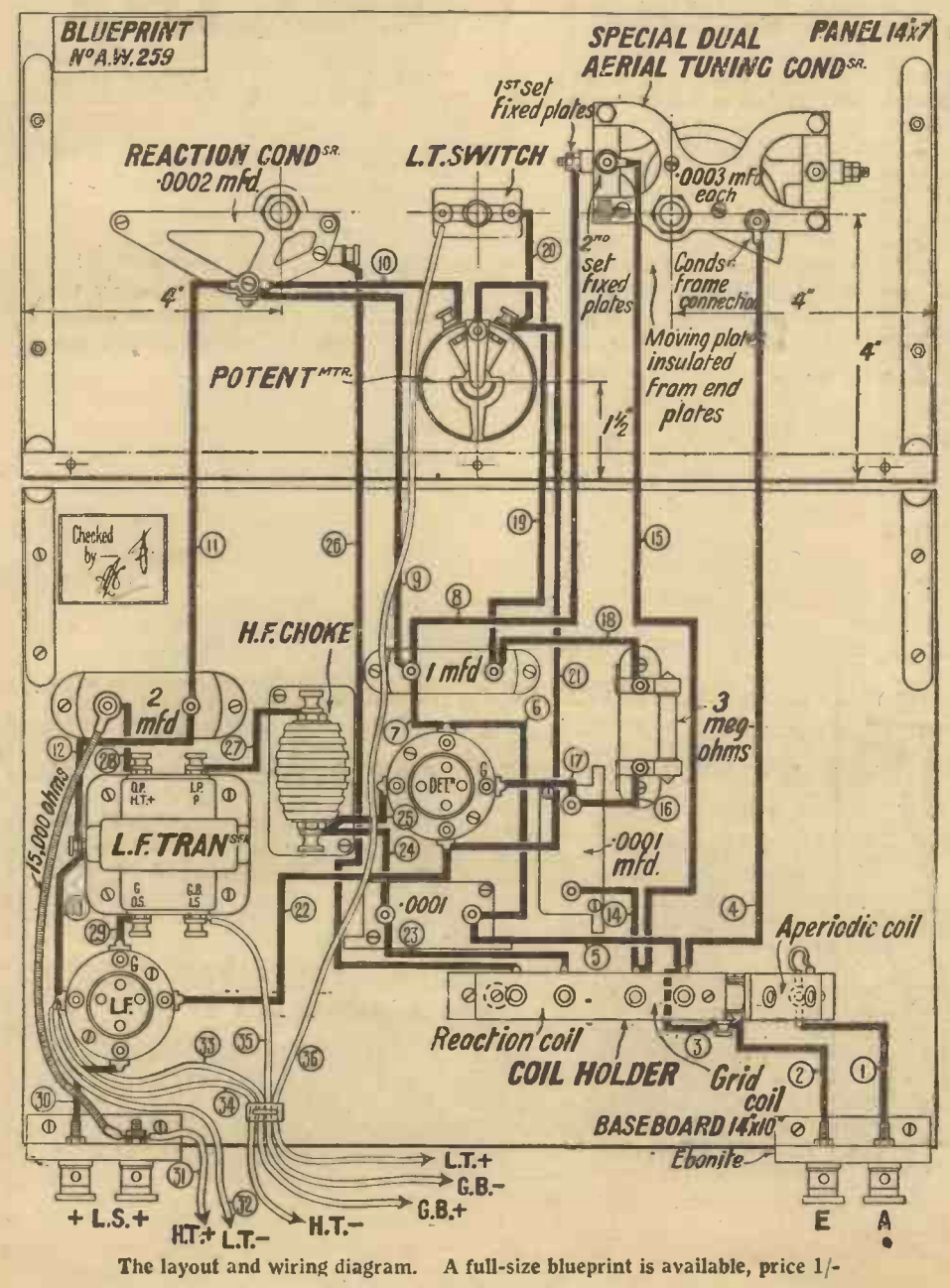
The high-tension voltage may also be adjusted, but, generally speaking, it will be found that good results will be obtained with 100 or 120 volts, and 7 or 9 volts should be applied to the grid-bias plugs.

"THE SEARCHER SHORT-WAVE TWO"

(*Continued from preceding page*)



When building a short-wave set the tried layout should be followed closely if the best results are to be obtained



The layout and wiring diagram. A full-size blueprint is available, price 1/-

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IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

A Coil Puzzle

THE point often crops up as to whether it is better to connect the long and medium wavelength coils in parallel or to short-circuit the long-wave part when tuning over the medium waves.

Actually, sometimes one method is better than the other, and it seems to depend upon the position of the coils and their shape and size. A long-wave coil when short-circuited may have a natural wavelength within the medium wavelength band. And if the long- and medium-wave coils are fairly near together the effect may be to reduce materially the strength of the signals.

When the coils are not too close together and are astatically wound, the chances of one circuit affecting the other are remote. At the same time, curious effects are produced by slight couplings. When experimenting, one should try joining the coils first in series and then in parallel, for a rule cannot be given. Some good dual-range coils have been made with the windings arranged both in series and in parallel, and, let me add, some bad ones as well.

All-metal Sets

The practice of using a metal base or of covering the baseboard with copper foil for shielding purposes seems to be on the increase. Valve holders and other parts are screwed down in the usual way, and the point that these parts were probably designed for a wooden baseboard is overlooked.

The result is that live contacts often lie very near the earthed metal, and on occasions a contact is actually made. Valve holders, for instance, sometimes have terminal screws which only just clear. In tightening down wires the screws may work down a little, when contacts will be formed.

It is a good plan when in doubt to place a sheet of insulating material below the valve holders, so as to avoid the chance of this fault occurring. Care is also needed with some other parts.

Coils, for example, may have contacts beneath them with only just enough clearance. Screw heads should therefore be examined, and if they seem too near the lower surface of the base, the precaution of using a sheet of insulating material should be taken.

Those Cheap Transformers

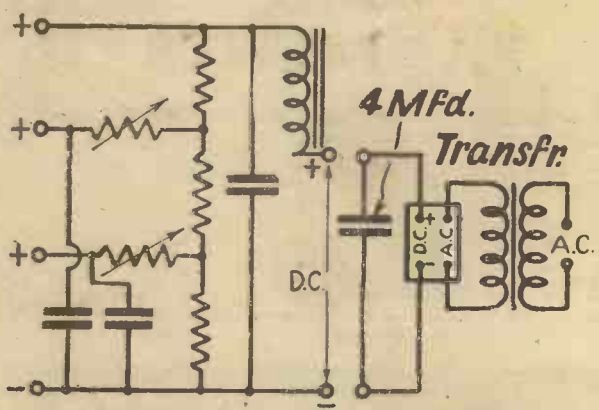
Cheap transformers, having but few turns of wire in their primary coils, often will pass a surprisingly large current before saturation of the core commences.

This means that a fairly low-impedance valve may be used with them. The quality of the reproduction may, therefore, be fair, but you should not forget that when poor quality iron stampings are used there may be more or less bad distortion.

Whether this is noticed depends upon the rest of the set and the loud-speaker. There may be so much distortion elsewhere in the set that transformer distortion is not noticeable. With small sets the last valve may be so overloaded that other distortions are of no great account.

From D.C. to A.C.

There are one or two difficulties in the way of changing over a direct-current mains unit to alternating current.



This is the circuit of a typical mains eliminator

DO YOU KNOW—

that in a mains-driven set there are two advantages in having a choke or transformer output for the speaker? One is that the speaker is insulated from the mains current and the other is that the smoothing and elimination of hum are materially improved.

that if the reaction control of your set is tricky, you might try fitting a differential condenser in place of the plain two-vane type? Differential reaction control does not upset tuning to the same extent as plain control.

that if your mains eliminator hums and you do not want to interfere with the connections then you might try putting a 2-microfarad condenser across the mains input wires? The condenser should be capable of standing up to the full mains voltage.

It is not safe simply to connect a transformer and rectifier unit to the D.C. unit, for the reason that the D.C. unit may have unsuitable parts.

Thus, in some types a potentiometer is fitted, as indicated in the accompanying diagram. This will pass a fair current—perhaps too much for the rectifier. Then, again, the choke may have a very high resistance, this not being of great importance when the D.C. voltage is relatively high.

When the output from the A.C. part is limited, however, the choke may too seriously restrict the supply to the set. A by-pass condenser should be provided across the output from the rectifier and the potentiometer ought to be removed if it passes more than a few milliamperes. As a rule, the D.C. unit should be re-built for the best results and proper anode resistance and condenser filters be added.

Your Aerial

I have often wondered whether the size of the wire used as the aerial is of great importance, and now I am inclined to believe that this is perhaps the least important feature of the aerial circuit.

Most of the resistance seems to be localised in the earth. Many people use earth tubes and neglect them, so that the actual earth-circuit resistance is pretty high. A copper-wire aerial of not smaller than, say, No. 24 gauge seems satisfactory with average tuning coils and earths.

There seems no electrical advantage in using stranded wire or very thick wires unless, of course, a highly efficient aerial and earth circuit is being constructed. The mistake usually made is in the earth circuit. A wire wrapped round a pipe seems to suit many people; but, really, is not good. A clip which grips a pipe going to earth is much better.

The outstanding feature of the day's music from Midland Regional on December 10 is a programme of works by British composers by the studio orchestra.

"The Kingdom," by Sir Edward Elgar, will be given at the first concert for the season of the Cardiff Musical Society in the Park Hall, Cardiff, on December 7 The coming season is the forty-third of the society's existence, and for the third year the National Orchestra of Wales will take part in the concerts.

SETS OF DISTINCTION

The VARLEY JUNIOR TWO

Makers : Varley Ltd. *Price : 15 gns.*

AMONG the host of two-valve all-electric sets of the season, the Varley Junior Two is outstanding. Its rather high price needs some justification in these hard times. Well, in my opinion, the performance justifies the extra guinea or so. There will always be people, no matter how hard the times, who insist on something a little better than the average.

Like all Varley sets, this two-valver is good to look at. The makers must have a fine aesthetic sense. And a good idea of the housewife's outlook when the mere male goes to buy a set. I have authentic experience of sets turned down by the lady of the house on account of poor cabinet work.

Very Attractive

The picture shows how modern is the conception of the cabinet work of the Varley set. I can add that the burr-walnut finish is extremely attractive. In fact, the fine appearance of the set alone justifies the price asked.

The controls are, naturally, simple and few in number. In the centre of the front of the cabinet is a slow-motion tuning dial, with an operating knob mounted below. To the left of the tuner is a handy knob for controlling reaction. I am glad to see this knob is plainly engraved "reaction" and that an arrow indicates the direction for turning the knob to increase reaction. Likewise the knob on the right of the tuner is engraved to show that when the knob is moved to the left the medium waves are in tune and when moved to the right the long waves. This is undoubtedly a fine set for family use.

The top half of the back of the cabinet can be removed, by undoing two screws, to get at the valves and mains connections. A look round the interior showed an unsparing use of the very best material. An extremely large tuning coil for the medium waves was noted with interest. As far away from it as possible I noted the long-wave coil. Both look highly efficient, as indeed they are.

In an accessible position is the mains transformer, with three plug sockets marked 200 v., 220 v., and 240 v., to make the set suitable for all A.C. supplies between 200 and 250 volts. The detector valve and the power valve are fitted close together at one side of the cabinet. The rectifying valve for deriving the high-tension from the supply is fitted near the mains transformer.

The terminal strip just below the removable back is unusually free from confusion. The two loud-speaker terminals are at the left and the earth terminal at the extreme right. Near this is the socket for gramophone pick-up, and further to the left are four aerial terminals, providing for every conceivable length of aerial.

The makers have wisely fitted small fuses in each of the two mains connections. And I see a small packet of spare fuse wire is thoughtfully pinned inside near the mains transformer. There is a negligible chance of the fuse being wanted, but the makers are taking no chances.

Now the reader will want to know what sort of results can be expected from this set. Firstly, I would like to emphasise that this is more than a set ; it is a very fine gramophone amplifier as well. The facilities for amplifying records are the same in this two as in the Varley and other threes, where the high-frequency amplifier is cut out of circuit for gramo-radio work. I tried the Varley Junior as a gramophone amplifier, using a B.T.H. pick-up and a Ferranti permanent-magnet moving-coil loud-speaker. The quality was wonderful.

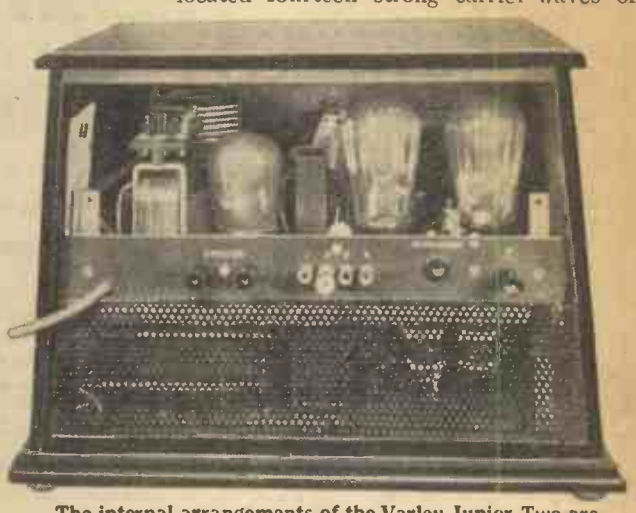
On the radio side this fine quality is well maintained, the two Brookman's Park stations coming through with great clarity. The first thing I established was the selectivity, a property that is just as important in a two-valver as in a larger set. At worst, the set must be able to separate the two Regional programmes, so that each can be clearly heard without an obligato from the other. At best, the set will do this without sacrificing volume. And that is where the very fine tuning coils of the Varley set distinguish themselves. The following readings speak for themselves :—

The National London station was tuned in at maximum strength at 31 degrees on the dial. It was entirely inaudible at 33 and 27, indicating a spread of only 6 degrees. The Regional London station was at its maximum at 56 degrees and had gone at 65 and 45, a spread of 20 degrees. For this test I was using the No. 1 aerial terminal, which gives the greatest volume and the least selectivity.

As the aerial was a full 70 feet long, I consider the set behaved extremely well. And by changing over to No. 2 aerial terminal the tuning was made razor sharp, without much loss of volume. The tests show that this little set is inherently selective and that local regional stations can be separated without loss of signal strength.

A Good Trier

The Varley Junior is also a good trier; in addition to the Midland Regional at 93 on the dial, a good loud-speaker signal, I located fourteen strong carrier waves of foreign stations. Rome at 81 was almost as strong as the Midland. Toulouse, Cologne and Nürnberg were also quite strong.



The internal arrangements of the Varley Junior Two are particularly neat : note the accessibility of the valves and the efficient disposition of the mains apparatus

On the long waves the set works well. Daventry at 75 was very strong. Huizen at 95 could just be called a loud-speaker signal, while Eiffel Tower at 62 was easily heard at good strength and quite clear of Daventry.

So although intended as a local set, the Varley Junior can, in the hands of an operator who understands the funny ways of reaction, bring in not a few foreigners.

This set is made for D.C. and A.C. mains. Two separate models are listed. My notes refer to the A.C. set. The D.C. model is a guinea more.

SET TESTER.

A light orchestral programme will be given by the National Orchestra of Wales from the Cardiff studio on December 8.

GREATEST RADIO SENSATION

NEW 3-VALVE SET OBTAINS OVER 50 STATIONS ON LOUD SPEAKER WITH DAVENTRY 5GB WORKING

This is the new Northampton Plating Co. Super Selective 3-Valve Loud Speaker set, which is now offered to the public. After months of careful research a circuit has been designed superior in selectivity to a screen-grid set, and yet remarkably simple. It can be used, not only for cutting out the local station, but for other disturbances such as Morse. It is the simplest, cheapest, and most selective in the world. No soldering required or coil changing. Experts have declared it absolutely unique. Over fifty stations have been obtained on loud speaker with aerial 20 feet high using cheap valves, including Cardiff, Paris, Madrid, Manchester, Stuttgart, Toulouse, Hamburg, Glasgow, Frankfurt, Rome, Langenberg, Berlin, Brussels, Hilversum, Kalundborg, Konigswusterhausen, Radio Paris. These were obtained 3 miles from Daventry while 5GB was working. Thousands of novices with no knowledge of wireless have built the old Northampton Plating Co. Super 2 and 3 in all parts of the world, and have been astounded by the results even with cheap components, but the new Super Selective 3 makes other sets old fashioned, and marks the greatest improvement in valve sets for years. Orders have poured in from all parts of the world, including America, Turkey, Gold Coast, and Nigeria. In order to give everyone the opportunity of testing out the new circuit, two 6d. Blueprints, one for new Super Selective 2 and one for Super Selective 3 Valve, will be supplied for 3d. each.

NEW SUPER 4-VALVE PORTABLE SEPARATES TWO BROOKMANS PARK STATIONS UNDER THE AERIALS

This is the latest model circuit by the Northampton Plating Co. offered to the public for the first time. It has been specially designed to satisfy the requirements of the new regional stations. Owing to its wonderful selectivity, it requires no wavetrap and obtains under favourable conditions a large number of Continental stations at loud-speaker strength, including Toulouse, Hilversum, Eiffel Tower, Konigswusterhausen, and Radio Paris. At less than half the price of a high-class portable set, it is acknowledged under severe technical tests to be far superior. In order to show what marvellous results can be obtained the set was placed between two aerials at the entrance to Brookmans Park, and the two programmes were easily separated. The set was also taken on a 1,000-mile motor tour over England and Wales. On the south coast and east coast many stations were easily obtained on loud-speaker at good strength. Even in Wales, where reception is difficult, excellent results were also obtained. In order that everyone may be able to construct this unique portable set, a full-size shilling Blueprint, with details and instructions, can be obtained from Northampton Plating Co. for 6d. Letters must be fully stamped. NAME AND ADDRESS IN BLOCK LETTERS.

TRADE SERVICE AGENTS WANTED.

READ THE LATEST REPORTS BY THE LEADING RADIO EXPERTS OF THE DAY :—

I refer to the receiver marketed by the Northampton Plating Co. as a kit set at a price that is more than reasonable. I had a pleasant surprise when I first operated it. I found there were 12 or 13 stations easily brought in at loud-speaker strength on the medium waves, in addition to 5GB. The set has remarkable qualities of selectivity and sensitivity, two characteristics rarely coupled in any one receiver. It must be set down as a definite advance.

("NOTTINGHAM JOURNAL," December 21, 1929.)

Those who are too far from a station to use a crystal and are deterred from wireless by the present high cost of valves, will find it best to make a set from the Northampton Co.'s blueprints for two or three valves, price 3d. each. If they cannot afford a Mullard, the same company supply excellent valves at 4s. 11d., which give admirable reception, though so cheap. A thoroughly good two-valve set ought not to cost more than £2 10s., including everything, and a three-valve about 11s. more. ("REYNOLDS'S NEWS," January 12, 1930.)

READ THESE TESTIMONIALS.

I have had your Super 3 since Sept., 1929, and have had wonderful results, about 50 stations at full loud-speaker strength, and can get most of these any night of the week, chief among them being: Paris, Eiffel Tower, Budapest, Prague, Belgrade, Stockholm, Madrid, Toulouse, Stuttgart, Barcelona, Turin, Maravstra-Ostrava, Rome, Algiers, Langenberg, Oslo, Lahti, and Kaunsas. Wishing you every success.—W. T. Emsworth, Hants, 17/1/30.

I must write and tell you I am more than pleased with your three-valve set I have just made. It is the most wonderful bargain I have ever known in wireless, and it is all that you claim of it. I wish to recommend it to my friend, who is a keen wireless enthusiast.—W. F. T., Derby, 16/1/30.

I have now built up your Super Three Valve set, and, independent of price, I have never heard or seen a set to beat it. We are still getting fresh stations, and up to the present have logged 20 at full loud-speaker strength. As I am writing we are hearing an Aria from Rome. My last set cost me about £25. Your Super Three has cost me less than £5, including accumulators.—W. A. P., Norwich, 3/2/30

Referring to the 3-valve set recently supplied, I have pleasure in informing you how satisfied I am with it. I recently put an up expensive 4-valver, and had such bad results. I may say I have had many circuits in use up to 5 valves with very good results—that means quality of reception, volume, and distance. I purchased your Super 3 really for local use. As you will see, I am on top of the Brookmans Park Transmitter. The results I am getting are equal to my best with 4 and 5 valves. I can still have my Continentals on the loud-speaker, and with perfect quality. Wishing you every success. —Yours faithfully, V. M., Cheshunt, Herts.

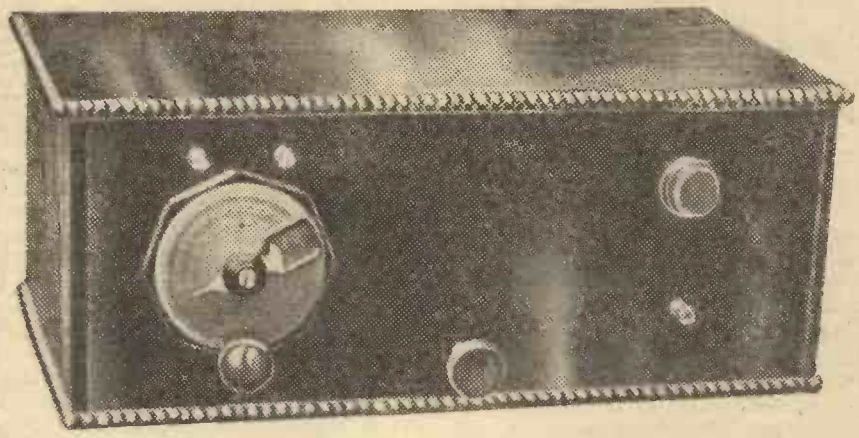
I feel I must write and congratulate you on a wonderful circuit. I have now had your "Northampton 3" only two nights, but in those two nights it has fully justified itself. I have the poorest of poor indoor aerials, and I have in 10 minutes logged 16 stations on the Loud-speaker. I have had to insert a volume control because of the power of the local station (Bournemouth, 70 miles away) and 5GB. I have just received Oslo, Paris (2), Hamburg, Berlin, Budapest, and many others. Your "3" gives 90 per cent. better results than you specify. Wishing your sets the best of luck in the future.—Yours very satisfied, C. D. N.

I have examined the above testimonials and am satisfied that these are genuine communications.— Advertisement Manager, "News-Chronicle."

THE NORTHAMPTON PLATING CO. SUPER A.C. ELIMINATOR

SPECIAL OFFER

Seven days approval to test. This A.C. eliminator, value £4, will be sent to any address on payment of 59s. cash or C.O.D., with the guarantee that if it is not superior to any other eliminator on the market and not giving complete satisfaction the money will be instantly refunded if returned in good condition and undamaged. It is guaranteed to be most silent in operation, giving over 20 milliamperes, and suitable for all 2-, 3-, and 4-valve sets. Test it for yourself. Trade inquiries invited.



SPECIAL WIRELESS AND CYCLE BARGAINS

Usual Price.		Sale Price
10/-	Latest Type Cabinet, 12 by 8	4/11
5/-	Ebonite for same, 12 by 8	3/-
5/11	Transformer	3/6
4/6	.0005 Variable Condenser	2/11
2/-	.002 Condenser	1/3
1/6	.003 ,,	10d.
1/-	Grid Leak, 2 meg.	10d.
1/-	Anti-Mic. Valve Holder	9d.
2/3	Rheostat	9d.
2/-	Indoor Aerial	9d.
5/-	Earth Tube	1/6
10/-	Guaranteed Phones	4/11
3/6	S.M. Dial	1/11

Usual Price.		Sale Price.
17/6	New Cossor Type Long-wave Coils, pair	9/6
7/6	Volume Control	3/11
7/6	H.F. Choke	3/11
2/6	Daventry 5GB Coil	1/3
10/6	6-volt Amplion Valve	3/11
12/6	Cone Unit	6/11
12/6	Cone Speaker Cabinets	7/11
2/-	12 in. Cone Speaker Frets	11d.
3/-	15 in. Cone Speaker Frets	1/11
7/6	Old Cossor Type Coils	3/11
15/-	Old Cossor Type Cabinets, 21 by 7	7/11
	Ebonite for same	3/11

Usual Price.		Sale Price.
12/6	Mullard Type Cabinet, 18 by 7	6/11
7/6	Aluminium Panel, 18 by 7	3/11
17/6	Dual Coil for M.M3	12/6
	Tritron Dull Emitter Valve	4/11
5/-	Cycle Tyre	2/6
2/6	Cycle Tube	1/3
6d.	Panel Transfer	3d.
6/6	Double-reading Voltmeter	3/11
	Tritron Super Power Valve	6/6
15/-	Titan Coil	9/11
9/-	60-volt H.T. Battery	4/11

Usual Price.		Sale Price.
12/6	100-volt H.T. Battery	8/11
5/6	2-volt Accumulator	3/6
2/-	Accumulator Carr.	11d.
4/6	Neutralising Condenser	2/11
4/-	Reaction Condenser	2/6
5/-	Dif. Reaction	2/11
2/-	Loud-speaker Cord	11d.
2/-	'Phone Cord	11d.
6/-	S.L.F. Condenser	3/11
21/-	D.C. Eliminator, 15 milliamps	17/6
£4	A.C. ,, 20 milliamps	59/-
17/6	Electric Iron. Weight, 5 lb.	7/11
30/-	Cone Speaker	9/11
	'Phones Repaired	2/6

New Cycles, Guaranteed, 59/11; with 3-speed, 79/11; with Dunlop Tyres, 10/- extra.

Parts supplied for all sets at Reduced Prices. Send now to avoid disappointment. Cash with order or C.O.D. Special terms to those making sets. All goods guaranteed and exchanged if not satisfactory. Inquire for anything you want. Trade supplied. Send for our wonderful Bargain Price List, A.W.

Trade Service Agents Wanted.

Owing to the enormous number of inquiries and orders, write clearly Name and Address in Block letters to the firm that made Radio popular. Letters must be fully stamped.

NORTHAMPTON PLATING CO. (Radio & Cycle Manufacturers), NORTHAMPTON

IS RESISTANCE COUPLING OUT OF DATE?

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

RESISTANCE-CAPACITY coupling was one of the earliest forms of intervalve coupling used in valve amplifiers. It is still one of the most popular forms of coupling, although it has passed through many phases. The values of anode resistance have varied from a few ohms to several megohms, and the other constants in the circuit have varied accordingly. In fact, there are in use to-day resistance-coupled amplifiers having values as widely different as those just stated and probably all working with a certain degree of satisfaction.

This has created the impression that resistance-capacity coupling is not critical as regards the choice of values. Actually nothing is farther from the truth. This form of amplifier requires as careful design as any other form. Admittedly it is somewhat easier to vary the values of the components, for the average user cannot vary the inductance of the transformer at will, nor can he alter the characteristics to suit his requirements, whereas a change in the value of his resistance or coupling condenser will often make a very material difference

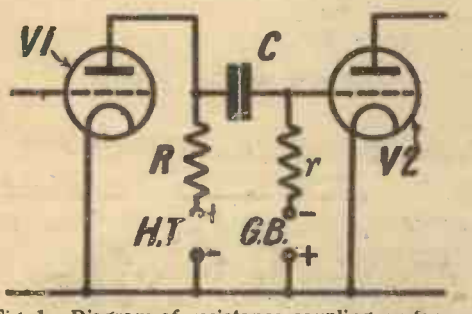


Fig. 1. Diagram of resistance-coupling system

to his quality. The purpose of this article is to suggest that in many cases the values used for this form of coupling are quite incorrect in the light of modern experience, and that from this point of view the system, as put into practice in the majority of cases, is out of date.

A QUESTION OF DESIGN

The design of a resistance-coupled amplifier can be divided into two distinct stages. In the first place, one may, by paying attention to the general details, produce an amplifier which is capable of giving good quality under normal conditions. The second stage results from an analysis of the working of such an amplifier under abnormal conditions, such as transient phenomena produced by cymbals or pizzicato strings and such-like effects. The benefits obtained here from the use of correctly-proportioned parts are only discernible on a good loudspeaker and to a good musical ear. I propose in the present article to discuss the first stage in the design and to review quite briefly the modern ideas on the subject. In a later and second article I propose to discuss those factors which affect the more critical listener, dealing with the phase shift or time lag which is experienced with this form of coupling.

There are three main components in a resistance-capacity coupled system, namely, the anode resistance, the grid leak, and the coupling condenser. The system is shown in skeleton form in Fig. 1, and its action is as follows. If varying voltage is applied to the grid of the first valve V1, similar but magnified voltages are produced across the anode resistance R due to the varying anode current of the valve. This voltage is applied across the grid and filament of the next valve V2, through a coupling condenser C, which serves to prevent the high-tension voltage from reaching the grid of the next valve. The grid-leak resistance R is necessary in order to see that the grid of the second valve is working with its correct bias point, the bottom end of the grid leak being connected to the grid-bias battery as shown.

THE ANODE RESISTANCE

The value of the anode resistance is determined by the valve with which it is to be used. If the resistance is small, most of the voltage developed is absorbed by the valve itself. As the external resistance is increased, so a larger proportion of the voltage is developed external to the valve, but beyond a certain point the increase is only relatively small. The amplification obtained from the valve in terms of the anode resistance is shown in Fig. 2.

On the other hand, if we start with a limited high-tension voltage, as is usually the case, then the larger we make the anode resistance, the less the voltage actually applied to the valve. Most of the voltage is wasted on the anode resistance, and only a small fraction is left for the valve. If we make the anode resistance three times that of the valve, we shall obtain one-quarter of the total voltage on the valve itself. Using a 120-volt battery, this means 30 volts only on the valve, which is quite small enough, and a lower value than this is not desirable.

In most cases the valve which is being followed by the resistance coupling is used as a detector. If, as is usual, a grid detector is employed, 30 volts is none too much if one lives near a local station or if there is any high-frequency amplification before the detector. An H.F. valve with 30 volts on the anode will handle a grid swing of 1 volt H.F. without detector distortion setting in, but it will be clear that this involves a resistance of between 50,000 and 80,000 ohms only, with the average H.F. valve of to-day. This value in itself is distinctly smaller than is usually employed. If an R.C. valve is used, resistance may be increased to 150,000 ohms, or perhaps a little more, but a valve of this nature is only satisfactory where one is receiving relatively weak signals, and the modern tendency is to use an H.F. valve for a detector, even when R.C. coupling is being used.

Let us now consider the grid leak. Since the grid leak is virtually in parallel with the anode resistance, it must not be made too small or it will reduce the effective anode

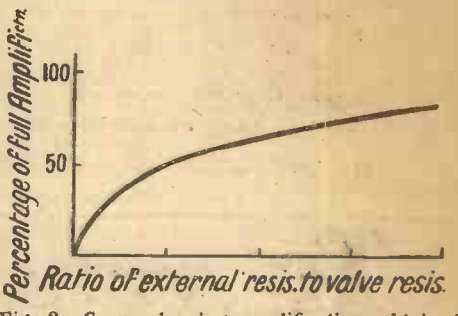


Fig. 2. Curve showing amplification obtained from a valve in terms of anode resistance

resistance and so cause a loss in signal strength. If the grid leak is made five or more times as great as the anode resistance, however, no trouble will be experienced on this account.

The grid leak must not be made too large, however, or there is a danger of what is known as "grid choking."

The value of the grid leak is actually wrapped up with that of the coupling condenser. It is essential that the coupling condenser shall act practically as a short circuit to all the speech currents, while still, of course, acting as a barrier to the high-tension steady voltage. The table given herewith shows the size of coupling condenser necessary to preserve the amplification at frequencies as low as 50 cycles. This value of coupling condenser will be seen to vary with the grid leak, becoming larger as the value of the grid leak is reduced.

At first sight it might seem economical, therefore, to use the largest value of grid leak permissible and use a smaller value of coupling condenser. I shall show in the concluding article, however, that this value of coupling condenser is the minimum which can be used, and that for the best results a distinctly larger value should be employed. This being the case, it pays to use a smaller value of grid leak.

Table showing relative values of coupling condenser and grid leak

Grid Leak (megohms)	*Coupling Condenser (microfarads)*
0.25	0.05
0.5	0.02
1.0	0.005
2.0	0.0035

WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

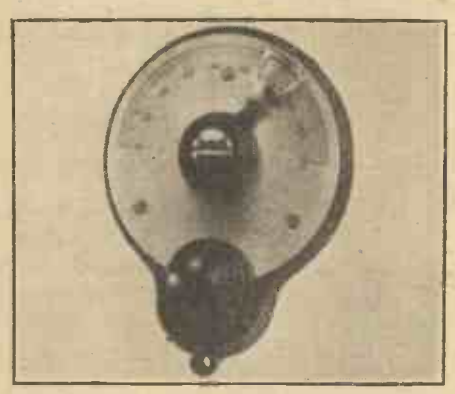
Conducted by our Technical Editor, J. H. REYNER, B.Sc., A.M.I.E.E.

Astra Slow-motion Dial

SLOW-MOTION dials have been sufficiently long on the market for their faults to be fully discovered and remedied. In consequence the discriminating user of to-day demands a slow-motion dial that will provide a suitable reduction ratio, absolute smoothness in motion, and freedom from any form of backlash. In addition he may require to work three or four condensers in cascade, and the mechanism must, therefore, take such a load without a tendency to slip.

We have no fault whatsoever to find with the Astra geared vernier dial Type 1, which is marketed in this country by the Emkabe Radio Co., Ltd.

The operating knob of this component is fitted below the centre of the dial and drives a 13-1 ratio reduction tooth gearing. The teeth are well cut, and the driving shaft is constrained by a spring to bear on the larger driven wheel, with the object of avoiding backlash. By giving the knob a slight push upwards, the gear is brought out of engagement and the main spindle can be readily rotated from the central knob, which also carries a cursor moving over a scale in black lettering on a silvered metal front plate. As far as we can discover there should be nothing whatsoever to go wrong with this mechanism, since the device for putting the operating spindle in and out of gear is quite foolproof.



Astra geared vernier dial

For mounting on a panel two holes only need be drilled, one for the main condenser spindle, and the other to take a metal support, which is also attached to the metal front plate, and may, therefore, be earthed. The condenser spindle fits into a split bush and is firmly fixed by screwing up an accessible knob on the front of the dial. A positive stop is provided in the minimum and maximum positions.

(*Continued on page* 848)

WE TEST FOR YOU

(*Continued from page* 846)

Owing to the smoothness of motion the dial is particularly pleasant to operate, and one may obtain a very fine graduation of tuning without a sign of backlash. The external appearance is quite attractive, whilst the diameter of the external moulding measures 3 in. The price of this component is 3s. 6d., and we recommend it for fine tuning.

Lewcos Constant-inductance Transformer

UNTIL quite recently the efficiency of a low-frequency transformer was often gauged from the inductance of the primary winding: whilst this inductance is of extreme importance, particularly when used in conjunction with high-impedance valves, it is now recognised that there are other factors requiring equal attention. Almost all iron-cored inductances vary in value when the current flowing through the winding is increased. If the variation is small throughout the working values of anode current, no perceptible distortion will result.

Lewcos constant-inductance transformer

On the other hand if the inductance varies, as it often does, more than 50 per cent., due to the change in polarising current caused by speech modulation, the effect may be serious, since the amplification will be different for different strengths of signal, thereby detracting from the natural qualities of reproduction.

In the new Lewcos constant-inductance transformer, steps have been taken to overcome this source of distortion throughout a wide range of polarising currents. When tested in our laboratories the inductance without polarising current was found to be 35.7 henries. This had risen to 37 henries at 4 milliamps, and fallen again to 35 henries at 14.5 milliamps. Even with a current of 30 milliamps through the windings, the inductance did not fall below 30 henries.

We have had considerable experience of constant-inductance chokes and transformers and can vouch for their advantages when used under normal conditions.

The price is 20s. and it may certainly be recommended.

Postcard Radio Literature

Gecophone Speakers

I LIKE the new Gecophone inductor dynamic speaker, which can be had eithe in chassis or complete cabinet forms. A little folder which I have received describe this, together with the "Stork" an "Junior Plaque" Gecophone speakers.

105

A Portable for Indoors

The Amplion portable has two screen grid stages, and experts tell me that it ha an excellent range. A folder which I hav illustrates it well, and shows that it is in neatly finished case, making it quite suit able for indoor use.

106

Batteries Catalogued

Ever-Ready have sent me their lates catalogue of batteries and this seems t give the whole Ever-Ready range, fro midget pocket lamp batteries to super capacity high-tension batteries, low-tensio accumulators and car-starter batteries.

107

For Home Builders

Home constructors will be interested i the new parts marketed by Edison Bell There are some handy plugs, jacks, valv holders, R.C. couplers, transformers an resistances listed in a new catalogue.

108

The New Melody-Maker

The new Cossor four-valve Melody Maker seems to be making a name for itself It is so low priced. A new Cossor folder give full details of this set and it will interes anyone who is on the lookout for a good ki receiver.

109

A "Baby" Portable

The term "baby" seems to be justified by a new portable produced by V. Zeitlin and Sons, Ltd., for it weighs only 14 lb. an measures 9½ in. by 9 in. by 8 in. It is a three-valver and is fitted with a speaker. A two-valve headphone model is also available

110

A Useful Catalogue

A good general catalogue of handy accessories for set builders is that produced by Superlamp, Ltd. This gives details of al the new parts for the 1931 season.

111

OBSERVER

GET THESE CATALOGUES FREE.

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58-61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire.

GERMANY RELAYS OUR DANCE MUSIC

ON two or three occasions recently the Berlin and Frankfurt broadcasting stations have given landline relays from Savoy Hill of dance bands engaged for the B.B.C. The other evening Germany took one and a quarter hours of dance music from Grosvenor House. It is interesting to remark that, since dance tunes seem to sweep from west to east, arriving in Germany several months after they are dead in this country, radio is in this instance not only killing space, but time as well. Judging by some of the direct broadcasts we occasionally pick up from German broadcasting stations, they are in dire need of good dance bands, such as those we import from America!

THE B.B.C. YEAR BOOK 1931

This annual, published on November 28, represents even a bigger attempt than has been made in previous years to chronicle the radio events and developments of the year and present them, with a wealth of photographs and illustrations, in the form of a year book. The period covered by the 1931 edition is from November 1, 1929, to October 31 of this year, and it is notable that in the short space of time allowed before going to press ample attention has been paid to the most topical radio happenings. The year book deals with each phase of the B.B.C.—programmes, policy, and engineering. It can be obtained, price 2s., from any bookstall or from the B.B.C. Bookshop at Savoy Hill.

Landline Balancing.—Apropos the article on B.B.C. landlines in our previous issue, there is a technical distinction that might have been made between "balancing" and "equalising." When a landline is balanced, the background noises due to cross currents and other causes are eliminated. But when the characteristic of the line is altered to enable it to handle the wide range of frequencies required for broadcasting, it is said to be equalised.—A. S. H.

Vert Wiring Clip.—It should be noted that the price of this handy wiring device is 2s. for a half-gross, sufficient for a three-valver, and not a gross as stated last week in the advertisement of W. Green and Sons (A), of Redclyffe, Horley, Surrey.

"Paper v. Electrolytic Condensers."—In connection with this article, which appeared on page 802 of last week's issue, it will be obvious that the sectional sketch shown illustrates the constructional features of an electrolytic condenser, and not a paper condenser, as stated.

It is estimated that 6,000,000 inhabitants living in German frontier provinces can only listen to foreign stations. In order to bring them in range of their own country the German Government is erecting three powerful broadcasting stations in Muehlacker, near Stuttgart: in Heilsberg, near Koenigsberg, and in the Rhineland.

During a Thunderstorm

SIR,—I wonder whether if any of your readers have experienced a phenomenon which happened about two months ago? I was listening-in to the Manchester programme during a thunderstorm. There was a vivid flash of lightning and also a loud click in the loud-speaker, which is of the cone type. A red glow accompanied the loud click in the speaker, which seemed to come out for about a foot all round the speaker. I am using an indoor aerial. The speaker was not damaged in any way whatever. W. M. (Manchester).

"The Exhibition Three"

SIR,—I have made up the "Exhibition Three" receiver and, whilst it works and gives reception, the tuning is flat and I seem to get a number of stations coming in at the same time. It seems that it is impossible to get selective tuning from the receiver. I am using Atlas plug-in coils and have wired the receiver exactly as described. Is there any way in which the selectivity can be improved?

F. S. (Oldham).

If you have wired up the pins and sockets of your coil holders exactly as shown in our blueprint, then please note the following. The tappings on the Atlas coils are nearest the pin or plug end of the coil, which means that for proper selectivity the aerial coil holder should be wired so that its socket is connected to the earth terminal. If you will completely reverse the connections to all of your coil holders in the receiver, you will overcome your present trouble. In other words, the wire now going to the terminal which is connected to the plug of each coil holder should be taken to the terminal which joins the socket, and vice versa. —ED.

"A.W." Solves your Wireless Problems

The Limit in High Tension

SIR,—Last November you gave particulars of how to build the B.B.C. one-valve set, and in the instructions you mentioned that 120 volts H.T. could be used, but that the set would work satisfactorily on 60 volts.

A Lissen 60-volt battery has worked this set quite satisfactorily since last March, but for some time particular clarity of tone has been observed.

Testing the battery last week, I could only find 2½ volts. Testing this on three different voltmeters, I was still not satisfied that it was correct.

Having a second 2-volt accumulator at hand, I used it on the H.T. connections and found the set worked perfectly with full volume on phones. The valve is a Mullard PM1LF, which has been in constant use since December, 1928.

N. T. H. (Balham).

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	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	45.0
376.4	797	Manchester	1.2
398.9	752	Glasgow	1.2
479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
246	1,220	Linz	0.6
246	1,220	Salzburg	0.6
283.0	1,058	Innsbruck	0.6
352	851	Graz	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
BELGIUM			
206	1,460	Antwerp	0.4
212	1,415	Binche	0.2
216	1,391	Chatelineau	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
251.4	1,194	Schaerbeek	0.5
338.2	887	Velthem (Louvain)	15.0
509	590	Brussels (No. 1)	1.2
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
294	1,020	Kosice	2.5
342	878	Brunn (Brno)	3.0
487	617	Prague (Praha)	5.5
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
221	1,355	Helsinki	15.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
172.5	1,739	St. Quentin	0.3
200	1,500	Radio Roubaix	0.2
210	1,430	Radio Touraine	0.2
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
244.9	1,224	Béziers	0.6
249.5	1,202	Juan-les-Pins	0.5
258	1,171	Toulouse (PTT)	1.0
265	1,136	Lille (PTT)	15.0
272	1,103	Rennes	1.2
286	1,049	Montpellier	2.0
287.2	1,044.6	Radio Lyons	0.5
296.4	1,012.1	Limoges (PTT)	0.08
300	1,000	Strasbourg	1.0
304	988	Bordeaux (PTT)	35.0
308	973	Neuilly (Paris)	0.3
313	958.5	Natan-Vitus	0.7
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911	Caen (Normandy)	0.6
329.5	910.3	Poste Parisien	1.2
345.2	869	Strasbourg (PTT)	12.0
369.3	812.2	Radio LL (Paris)	0.5
385	779	Radio Toulouse	9.0
447	671	Paris (PTT)	2.0
466	644	Lyons (PTT)	2.3
1,446	207	Eiffel Tower	15.0
1,725	174	Radio Paris	17.0
GERMANY			
31.38	9,560	Zeesen	15.0
218	1,373	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.31
232.2	1,292	Kiel	0.3
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.4	1,184	Leipzig	2.3
259.3	1,157	Gleiwitz	5.6
270	1,112	Kaiserslautern	0.25
276	1,085	Königsberg	1.7
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
316.6	947.6	Bremen	0.3
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Stuttgart	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
452.1	662	Danzig	0.25
473	635	Langenberg	17.0
533	563	Munich	1.7
560	536	Augsburg	0.3
566	530	Hanover	0.35
570	527	Freiburg	0.3
1,635	183.5	Zeesen	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
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299	1,004	Hilversum (also testing on 1,110m.)	8.5
299	1,004	Radio Idzerda (The Hague)	0.6
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1,875	160	Huizen	8.5
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296	1,013	Turin (Torino)	8.5
312	916.2	Genoa	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
453	662	Bolzano (1BZ)	0.2
501	599	Milan (Milano)	8.5
LATVIA			
525	572	Riga	12.0
LITHUANIA			
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NORTH AFRICA			
363.4	825.3	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.0
385	821	Frederiksstad	0.7
453.2	662	Porsgrund	1.5
453.2	662	Nidaros	1.2
1,060	283	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
244	1,229	Cracow	1.5
312.8	959	Wilno	0.5
338.1	887.1	Poznan	1.9
381	788	Lvov	2.2
409.8	732	Katowice	16.0
1,411	212.5	Warsaw	14.0
PORTUGAL			
240	1,247	Oporto (Teatro Apollo)	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	20.0
1,073	279.6	Kostov	4.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades' Unions)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	1.0
266.7	1,125	Barcelona (EAJ13)	10.0
349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
413.8	725	Radio Espana	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
230.6	1,301	Malmo	0.75
257	1,166	Hörby	15.0
300.2	999.3	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,229.5	244	Boden	0.75
1,348	222.5	Motala	40.0
SWITZERLAND			
318.8	943	Basle	0.65
403	743	Berne	1.1
459	653	Zurich	0.75
678.7	454.6	Lausanne	0.6
760	395	Geneva	1.5
TURKEY			
1,200	250	Istanbul	5.0
1,595	188.1	Ankara	7.0
YUGOSLAVIA			
306.8	978	Zagreb (Agram)	0.7
430.4	696.9	Belgrade	3.0
574.7	522	Ljubljana	2.8

NEW OPERA PLANS AND THE B.B.C.

LISTENERS who are anxious to have more broadcast operas will be pleased to hear of an arrangement made between the Covent Garden Opera Syndicate, Ltd., and the B.B.C. for carrying out a scheme of grand opera production over a number of years.

The undertaking will be administered by a company to be known as the Covent Garden Opera Syndicate (1930), Ltd., under the chairmanship of Mr. F. A. Szarvasy, the originator of the proposal.

More than two hundred performances will be given yearly, allocated between the grand season of ten weeks at Covent Garden, autumn and winter seasons there of six weeks each, and two-week seasons in at least six other centres throughout the country.

Except for the grand season, popular prices will be charged at all performances and the artistes employed will be almost exclusively British.

An income of £30,000 has been guaranteed from various sources, and all the funds and earnings of the new company will be devoted to furthering the scheme.

Arrangements are in the course of being completed for the participation of Sir Thomas Beecham and the Imperial League of Opera. At least sixty performances per annum will be broadcast.

RADIOGRAMS

A SERIES of old musical comedies will provide the material for a programme which is to be broadcast nationally on December 9. The title of the programme is "Theatrescope," and it will be presented by John Watt.

The symposium by distinguished medical men who have broadcast on the special aspects of medicine with which they are principally concerned will be brought to a close on December 1 by Sir Humphry Rolleston, who will summarise the problem as a whole. Sir Humphry is one of the King's physicians.

"Seasonal" music and poetry are very popular, and on December 7 Manchester and Leeds listeners will hear a concert called "Winter Landscape," performed by the Northern Wireless Orchestra.

On December 11 the Hallé Society are giving a performance of Gustav Mahler's "Song of the Earth" for broadcast from the Manchester and Leeds transmitters.

When Mr. L. du Garde Peach and Mr. E. W. Lustgarten join issue on December 10, on the important question of whether it is better to live in the North Country or in a Northern town, listeners in Manchester and Leeds may be sure of enjoying a very amusing and witty forty minutes.

"Contrasts," which is to be broadcast on December 3 (Regional) and December 6 (National) is the work of Derek McCulloch.

The third talk in the series "Talks to Amateur Dramatic Societies" is entitled "How to Dress a Play" and will be broadcast from Cardiff by Miss Mariam Radford on December 8.

Scissors for Luck, by Dorothy Howard Rowlands, will be given from Cardiff by the Bristol Drama Club on December 9 during a programme which is introduced by the National Orchestra of Wales.

Mr. C. B. Cochran will take the chair at a studio discussion on December 8 between Mr. Hugh Walpole and Mr. Osbert Sitwell.

(*Continued on page* 856)

When Submitting Queries . . . . . .

Please write concisely, giving essential particulars. **A Fee of One Shilling** (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

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Lodestone Four (HF, D, RC, Trans)	WM193
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AMATEUR WIRELESS 58-61 FETTER LANE LONDON, E.C.4.

"RADIOGRAMS"

(Continued from page 854)

They are going to try to find the answer to the question, "What's Wrong with the Theatre?" and their remarks will be heard by listeners to the National programme.

"The Foursome's" vaudeville programme on the National on December 1, to be repeated regionally on December 5, will open with the "Two Pairs" (Claude Hulbert and Enid Trevor, with Paul England and Pat Paterson), followed by Harold Waldon in stories and songs, Halina Bruczowna, Gillie Potter (comedian), and Elizabeth Pollock.

Speeches following the luncheon given by the English Speaking Union in honour of American Thanksgiving Day will be relayed from the Park Lane Hotel to London Regional on November 27. Listeners will hear Lord Burnham and Sir John and Lady Simon.

A concert by the Afan Glee Society will be relayed to Cardiff from Port Talbot on December 11. The vocalists will be May Huxley and Dennis Noble.

Cardiff listeners heard the City of Bristol Police Band during Bristol Radio Week, and this band returns to the studio on December 13. Their performance will be followed by a Christmas concert by the University of Bristol Madrigal Singers.

The fifth talk in the series "Wales To-day and To-morrow" will be given from Cardiff by Professor J. Saunders Lewis on "The National Standpoint" on December 6.

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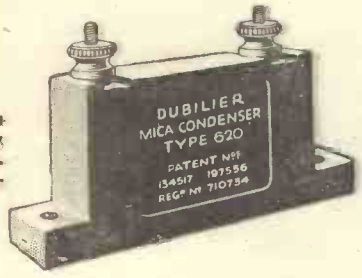

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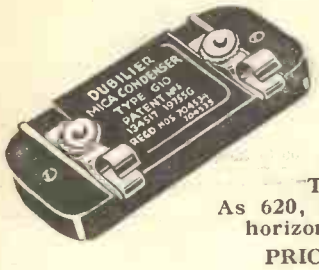

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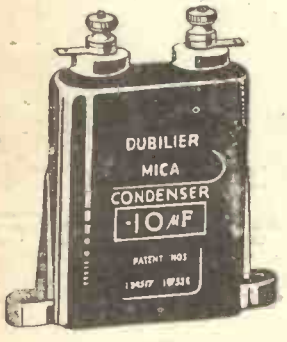

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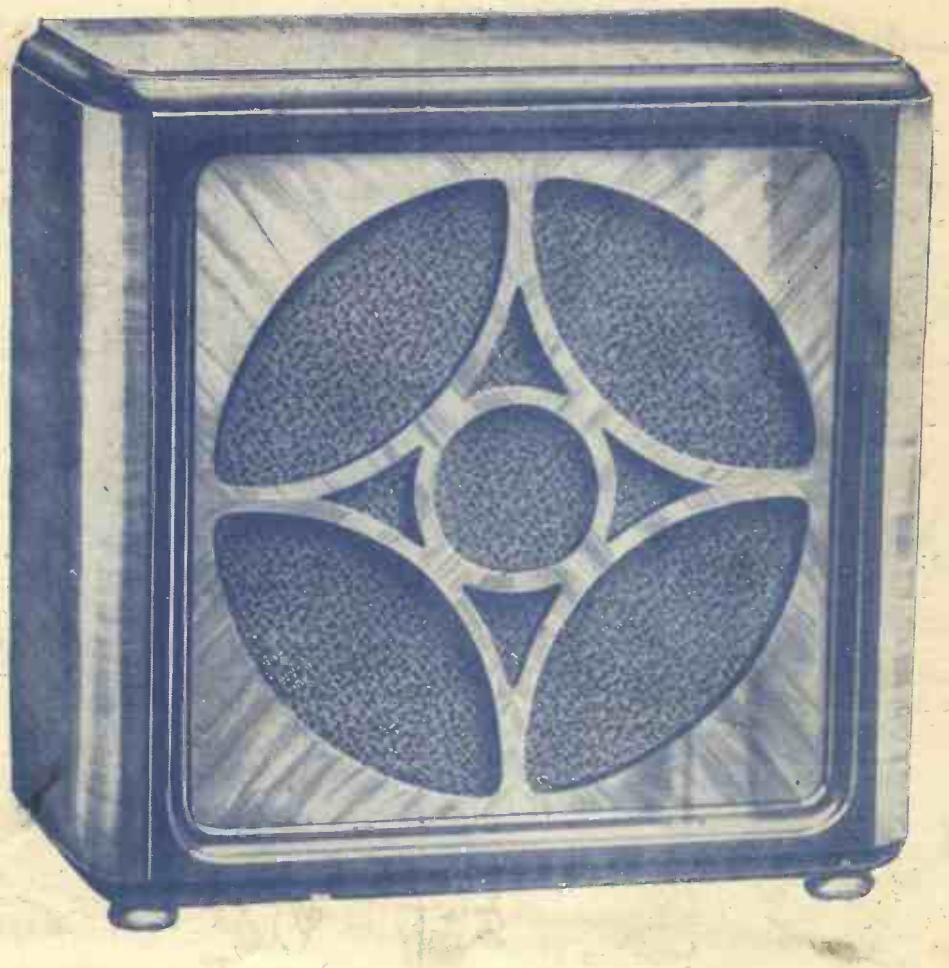

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