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# Amateur Wireless

Every Thursday 3<sup>d</sup>

and Radiovision

Vol. XIV. No. 347

Saturday, February 2, 1929

## The LISTENER'S THREE



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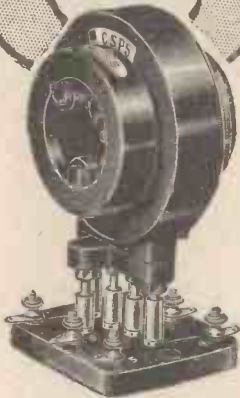
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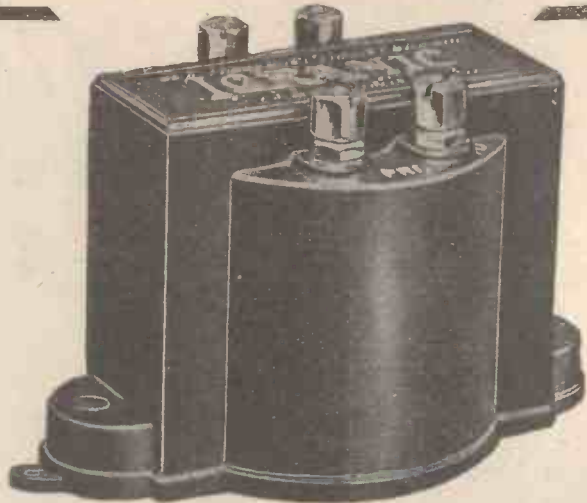


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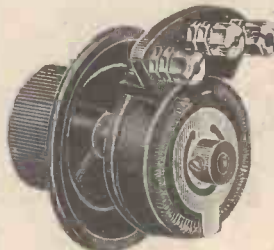
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# Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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## On Nothing Much!—Our New Uncle—Charlie and “Talkies”—From Hull—Variety Broadcasts—Fultograph News—That Political Talk—Next Week

**On Nothing Much!**—At the beginning of this week, as a special feature, we had Sir Oliver Lodge discoursing on “Emptiness; or Vacuum.” Only Sir Oliver could talk about nothing, and get away with it! But, then, his “nothings” generally mean something, and he is a valued broadcaster because he has the happy knack of explaining the infinite in terse and simple sentences!

**Our New Uncle**—One of the Savoy Hill “uncles” having left the B.B.C. for a most interesting sphere of film work, we now have a new “Uncle-in-Chief” of the Children’s Hour at 2LO. This is the well-known “Columbus,” who in private life is Alan Howland and who has been associated with the Children’s Hour for about four years.

**Charlie and “Talkies”**—It seems that we shall never hear Charlie Chaplin *via* the talking films, though many of us have heard him *via* radio. He has what is known in the States as an “English accent.” He was recently persuaded to tell a newspaper reporter that he thought “talkies” had a future, but he could not be inveigled into talking about the technical points, which might have interested AMATEUR WIRELESS readers.

**Variety Broadcasts**—As we go to press we learn that regular fortnightly broadcasts are to be made from the Alhambra and Coliseum music-halls, beginning with one from the Alhambra on February 12th. Sir Oswald Stoll has changed his policy at last!

**Fultograph News**—Two items to note. First, the Science Museum at Kensington has accepted a picture set for demonstration purposes in the lectures which are being



The three-valve short-wave set which has been given to the inhabitants of Tristan da Cunha by an African newspaper, being demonstrated at a well-known London wireless store to the Rev. C. A. Partridge, who is voluntarily going as chaplain to the isle.

given. Second, Wireless Pictures (1928) Ltd., are not limiting themselves to the sale of complete outfits, and home-construction is now possible.

**That Political Talk**—When 2LO, 5XX, and other stations recently gave a controversial broadcast on the De-rating

Bill, a new mode of dealing with the party broadcasters was undertaken at London. Instead of crowding together in one studio, each waiting his turn before the “mike,” they waited with their secretaries in the drawing-room at Savoy Hill. Each heard the others by means of loud-speakers, and when his turn to broadcast came he was taken up to the actual studio on the first floor.

**Now for the Prizes!**—There is a novel idea afoot for the presentation of the prizes to winners in the school broadcast transmissions. Lady Clarendon, wife of the Chairman of the B.B.C. Board of Governors, is to present the awards in one of the London studios, and this little affair will be broadcast through 2LO and 5XX.

**From Hull**—Here is a notable event for northern listeners for February 6. Hull is the possessor of a particularly live “Little Theatre”—one of the most adventurous in the repertory movement in the north. The players of this theatre are giving a play by St. John Hankin, *Thompson*. All stations of the northern grouping will hear this, and it is particularly interesting because Hankin died before it was complete.

**Next Week**—Do you like this week’s bumper number, containing a free blueprint of “The Listener’s Three” and a linen-diaphragm loud-speaker of exclusive AMATEUR WIRELESS design? Don’t on any account miss next week’s issue, which will contain further interesting details of the loud-speaker and an amazing reception log of the “three.” In addition, all the usual features, and constructional details of a two-valver of very simple design.

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OUR FREE BLUEPRINTS // MORE ABOUT THE SET AND SPEAKER NEXT WEEK

# The Voice Behind the Screen

Our Special Representative describes the Western Electric apparatus used for the Vitaphone and Movietone "Talkies"

UNDOUBTEDLY the two best-known sound-film systems now working in America and this country are those developed and produced by Western Electric and commercially known as Vitaphone and Movietone. The essential difference between the two is that the Vitaphone system gets its original electrical impulse from a disc record, whereas the Movietone has the sound recorded on a narrow strip at the side of the film, against the perforations. The above sound equipment at all modern cinemas allows of the use either of ordinary films with a synchronised record, or of the special sound films.

The Vitaphone will be most readily understood by the ordinary wireless man when it

chronism will be perfect on reproduction. Recently an AMATEUR WIRELESS Special Correspondent was allowed to peep behind the scenes in one of London's largest cinemas, possessing the very latest in Vitaphone equipment.

It comes as something of an eye opener even to one well versed in the technicalities of grammo-radio to see the large amount of apparatus which is used in this famous American "talkie" system, and which is fully justified by results.

The projectors, and there are usually two, three or four of these in a "super" cinema, are modified to fit in with the Vitaphone and Movietone arrangements. They are driven by special electric motors, which also actuate the turn-table carrying the speech record. Externally the projectors do not differ very much from the standard article. The most noticeable item is a large turntable on a standard at the back of each. This is protected by a small rail so that it does not catch in the clothing of the control man in the operating box.

The records used are "outsize," being 16 in. in diameter. They are one-sided; they

start from the inside instead of from the outside as is conventional and rotate at about half the normal speed, namely 33½ r.p.m. About twenty playings are allowed for each. Western Electric are very keen on getting the best quality.

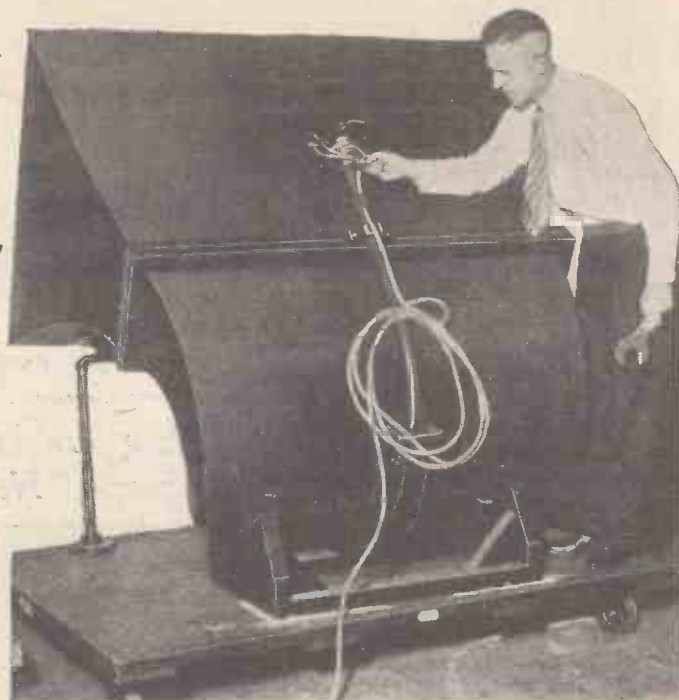
A small red line on the inside of the record shows the exact start of the sound grooves, and when commencing the run of a "talkie" film the needle of a balanced pick-up arm is placed exactly on this red line. The film is arranged in the gate of the projector so that a special pre-marked "frame" (that is, one little picture on the film), is in the light path. This is all the synchronising that is necessary for, obviously, as this synchronism is prearranged it is maintained during the whole run of the record.

### Pick-up Output

Now we must go back a little to see what takes place if a Movietone sound-film is being used. There is a separate gate on the projector below the main one and this deals with the sound record on the edge of the strip. A special lamp consuming 4 amps. at 12 volts passes an intense beam of light through the sound record strip on to a photo-electric cell of the potassium type, to which a potential of 90 volts is applied.

The output from this cell is so small that it is necessary to have a three-valve amplifier mounted in a shock-absorbing suspension system actually within the body of the projector, so that the leads from the cell to this first amplifier are only a few inches in length. This amplifier is very carefully shielded from

(Continued on page 192)



One of the giant loud-speakers at the back of the screen



Above: The speed of projector and turntable is controlled by a valve bridge arrangement. Right: Removing the pick-up which begins at the centre of the record

is explained that basically it is grammo-radio synchronised with the projection of the film. The film and record are taken and made simultaneously and thus if proper synchronising arrangements are used syn-



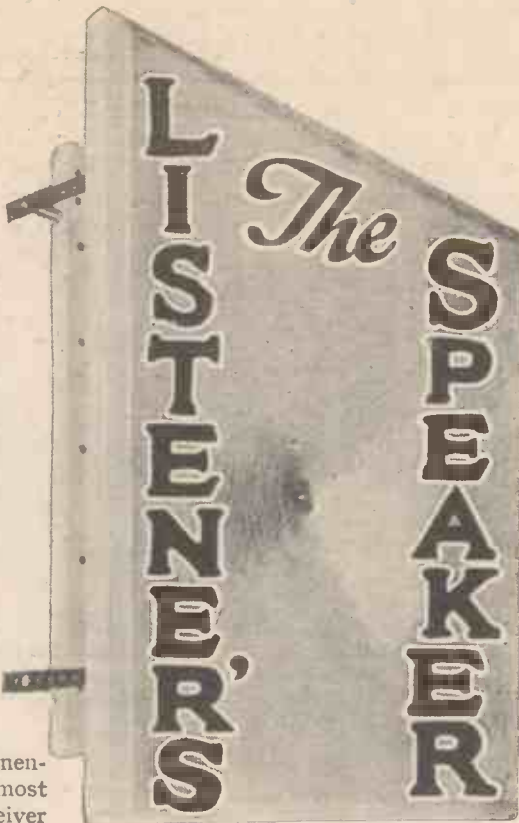


# THE LATEST AND BEST LINEN-DIAPHRAGM LOUD-SPEAKER

**T**HIS, the latest of the series of AMATEUR WIRELESS linen-diaphragm loud-speakers is particularly suited to the "Listener's Three," described in this issue, for several reasons. Perhaps the two most important are that judging by results this is one of the most efficient loud-speakers it is possible to construct for ordinary amateur use; this makes it a fit companion for the three-valver which is of most up-to-date design; moreover its dimensions and capabilities well suit it for the output of the set.

### Many Good Features

It must be emphasised that this linen-diaphragm loud-speaker will give most pleasing results with almost any receiver capable of giving loud-speaker output. As will be well-known to those who have constructed previous forms of the linen-diaphragm instrument, which I have described in AMATEUR WIRELESS, their particular merit in common is that they give a really astounding volume for an ordinary



By J. SIEGER

type. It will be obvious from the photographs and from the blueprint given free with this issue that this instrument comprises two stretched square diaphragms of linen, drawn together at their centres. The driving rod of a reed movement passes through the apex. To render the whole construction rigid both diaphragms (one of which is larger than the other in order to prevent a distinct natural frequency period) are "doped."

### An Innovation

There is one very important point on

A FREE  
BLUEPRINT  
OF THIS SPEAKER  
IS PRESENTED WITH  
THIS ISSUE

which the construction of the present instrument differs from its forerunners. It was found with some that a certain vibration period was set up which gave somewhat the effect of an echo. This was caused by the pull on the linen transmitting the sound vibrations to the frame and thence to the baffle, causing the whole to vibrate. This has now been eliminated by a rubber cushion on both diaphragms. This allows the diaphragms to vibrate substantially as separate entities without affecting the framework.

The measurements of this instrument

# SPECIALLY DESIGNED FOR USE WITH THE "LISTENER'S THREE"

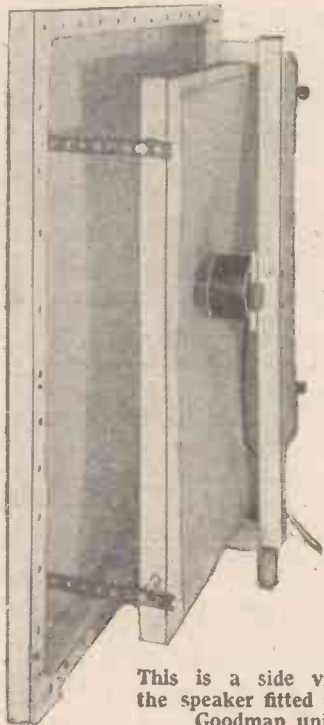
are also slightly smaller than those others that have been described. A reduction of 2 in. in the measurements of each side of the larger frame has helped to do away with any tendency towards resonance or booming.

### Construction

The first thing to be done when constructing the loud-speaker is to make the wooden framework. Approximately 18 ft. of 1 in. sq. section of wood are required. Actually this will have a  $\frac{7}{8}$  in. cross section since it is planed and finished and has what is known as a " $\frac{7}{8}$  in. finish." It is quite a simple matter to make the two frames, the pieces being simply nailed firmly together.

There are metal brackets for strengthening the corners. Flat angle plates, 4 in. by  $\frac{1}{2}$  in. steel were used as in the previous design. These plates are placed at the inside corners of each frame, on the same side as the rubber buffer, the mounting of which will shortly be described.

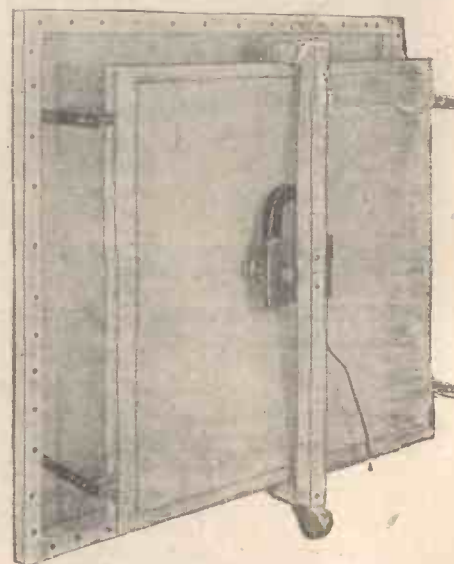
The correct material to employ for the diaphragms is best handkerchief linen, and 1  $\frac{1}{2}$  yds. are required. The rubber damping material used is a thin strip of tubular cross-section known as draught-stopper



This is a side view of the speaker fitted with a Goodman unit

commercial reed movement, and there is no jarring or undue accentuation over almost the whole musical scale.

Just a word for those who have not had previous experience of speakers of this



Here the speaker is shown fitted with a Blue Spot unit

rubber. This has a small "flange" of rubber along its length and it is this which is tacked down to the face of each square frame before stretching over the linen. The material should be cut to fit the frames and tacked around the edge of each. Upholsterers' small tacks should be used for this and should be spaced fairly close together.

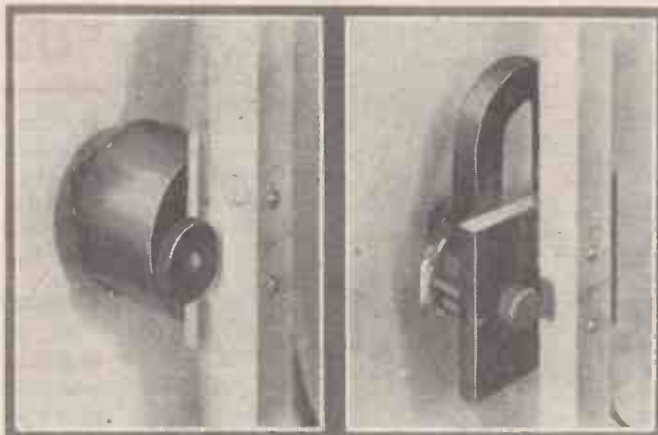
# THE LATEST AND BEST LINEN-DIAPHRAGM SPEAKER (Continued)

In order to prevent creases, which are fatal to good results, one side should be fastened and the linen then stretched across to the opposite side and tacked down on that side. One most important point is to see that the threads of the linen are perpendicular and parallel to the sides of the frame. When the four sides of each diaphragm have been secured, the corners should be pulled tight, turned over and then tacked down.

It is imperative to find the exact centre of each diaphragm, and this can be done by drawing two diagonal lines across the face of each. A sharp point, such as a gramophone needle, should then be used to force a hole in the diaphragms without breaking any of the threads, and in order to prevent these two holes enlarging themselves under the strain when the diaphragms are stretched a button-hole stitch

frame. Four lengths of 2BA screwed rod are passed right through the framework of the smaller diaphragm at four points and

extent, this giving six clear holes on each strip, and allow to dry. Another coat may then be applied; this will have dried by the time the reed movement is mounted.

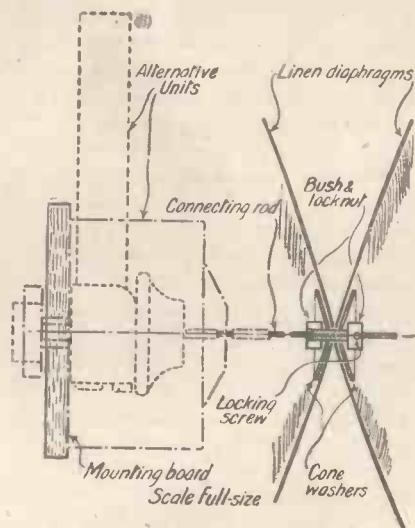


The mounting of two types of unit—the Goodman and the Blue Spot

### Mounting the Unit

The reed movement is attached to the batten at the back of the small diaphragm. This batten is of 3/4 in. finish wood and is 19 1/2 in. in length. It is separated from the diaphragm itself by two short lengths of wood to give a convenient clearance between the front of the reed mechanism and the back surface of the smaller diaphragm. The movement should be mounted, the driving rod being passed through a hollow washer and firmly secured thereto.

In order to get the best results it is essential that the instruments should be enclosed in a baffle cabinet, the back of which should not be closed



Section showing attachment of unit to diaphragms

should be made round each. Perhaps the lady of the house will oblige!

### Doping

The next operation is doping and this is carried out with Belco clear varnish. In previous designs I have used amyl-acetate in which celluloid is dissolved, but the Belco varnish is a cellulose compound which gives equally good results and obviates the messy business of dissolving the celluloid. One coat should be applied to the surface of each diaphragm and allowed to dry.

Another improvement which has been effected in this latest instrument is the method of stretching the two diaphragms apart. It will be seen that four short lengths of Meccano strip are used, these being screwed to the inside of the larger

the rod is secured as shown with 2BA nuts and washers on each side.

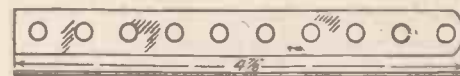
### Assembly

The larger diaphragm is then placed face downwards on the table and the smaller diaphragm placed over it, being supported by passing the four projecting 2BA rods through holes low down in the Meccano strips. No attempt should be made yet to stretch the diaphragms.

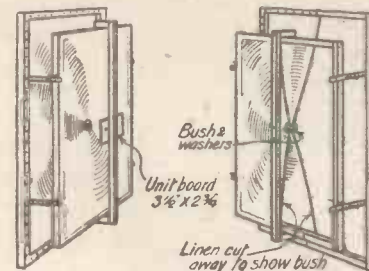
The cone washer should be passed through both diaphragms and screwed up tightly, care being taken that it is correctly assembled as is clearly shown in the blueprint. Then carefully stretch the two diaphragms apart by two holes on the strip, and apply a second coat of Belco varnish. It will, of course, be found necessary to enlarge the holes in the Meccano strip in order to take the 2BA rod. The strips employed have 10 holes, being cut off from larger strips, for the 10-hole size is not standard.

### Stretching the Diaphragm

Next stretch the diaphragm up by the extent of another hole on each strip. Two holes are occupied by wood screws at the end of the strip for fixing, and thus at this stage we have five clear holes between the wood screws and 2BA rods. Apply yet another coating of "dope" and while wet stretch the diaphragms apart to the fullest



Details of adjusting strip and method of attaching linen to frame



Two perspective sketches of the speaker

in. Further constructional details and hints will be given next week and these will be of assistance to amateurs who have not previously constructed a linen-diaphragm loud-speaker and may not be quite contented with the information it is possible to give in the brief space available in this issue.

The new Huizen 130-kilowatt short-wave telephony transmitter erected for the purpose of assuring daily two-way communication with the Dutch East Indies was formally opened on January 16.

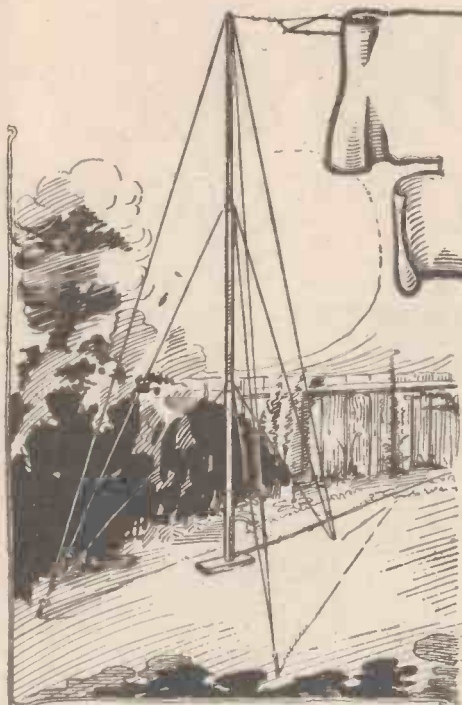
Radio Vitus, Paris, now broadcasts its daily concerts simultaneously on 322 metres and 41 metres, the latter with a power of 150 watts in the aerial. In the meantime, the Radio LL transmissions on 61 metres have been suspended.

**DO YOU KNOW—How the latest linen-diaphragm loud-speaker will revolutionise your reception? It can be used with any receiver. Get next week's issue to learn the latest details.**



# WHY NOT ERECT A METAL AERIAL MAST?

*The mast described below is made of gas piping, is simple to erect and is of better appearance than the average wooden mast*



**G**AS- or steam-pipe aerial masts are not by any means novel, but lack of information regarding their construction no doubt accounts for them not being as popular as they deserve. They are perhaps a little more expensive at the commencement than an unstayed scaffold pole, but their life and the strength which lies greatly in the stays warrants their erection. The avoidance of metal stays near the aerial is a great point where transmission is concerned, but for reception purposes little or no effect results from their presence.

A useful size aerial mast is one of about 30 ft. high, but the information given here will enable those desirous of going higher to adapt their needs from it.

The 30-ft. mast is composed of three sections of gas-pipe screwed together by means of sockets, and stayed by means of nine stay wires.

The materials required are as follows: One 10-ft. length 1 1/4-in. gas-pipe, screwed one end only; one 10-ft. length 1-in. gas-pipe, screwed both ends; one 10-ft. length 3/4-in. gas-pipe, screwed both ends; one reducing socket 1 1/4 in. to 1 in.; one reducing socket 1 in. to 3/4 in.; 100 yds. 7/20 s.w.g. galvanised iron wire; one pulley; nine 6-in. strainers; three stay bolts; four pieces 2 ft. by 2 in. by 4 in. timber; one

galvanised iron fastening cleat; small quantity 20 s.w.g. galvanised iron wire.

The first procedure is to arrange for the mast and stay footings. These are made from the 2 ft. 4 in. timber. In one only of these pieces of wood drill or chisel out for about 1 in. deep a hole to take the 1 1/4-in. pipe. This piece of wood is sunk in a hole just large enough to accommodate it in the ground, where the mast itself will stand. The hole need only be a few inches deep, as the earth round the mast foot does not take any part in the actual support of the mast, but merely prevents the foot of the mast slipping.

over them. The eyes of the stay bolts should protrude about 6 in. above ground.

The first of these stay footings is sunk in a direct line beneath where the aerial will be placed. The other two footings are placed behind the mast as shown in Fig. 2.

When these footings have been prepared, screw the component parts of the mast together, laying the bottom end of the 1 1/4-in. tube near the edge of the hole accommodating the centre footing. Proceed then to secure the stay wires of 7/20 s.w.g. galvanised wire to the mast. Three stays sufficiently long to reach the footings are cut off and passed through a large screw-eye fixed in the top of the mast. This fixing is accomplished by driving a round piece of wood into the open end of the top of the mast and screwing the eye into that.

### Staying

The fastening of the stays needs to be done carefully. The 7/20 wire is passed through the screw-eye twice and is then laid down along itself again and bound for about four inches with the single 20 s.w.g. wire. Fig. 3 will make this clear.

The pulley is also secured to the top of the mast by single No. 20 wire.

It is advisable at this stage to slip the halyard rope through the pulley.

Next, fit the second set of stays. These are passed completely round the mast just above the reducing sockets, which prevent the stays slipping down the mast. Fig. 4 shows how this is done. The last set of stays is fitted just above the bottom reducing sockets. (Fig. 5.)

When all the stays have been fixed, lay  
(Continued on next page)

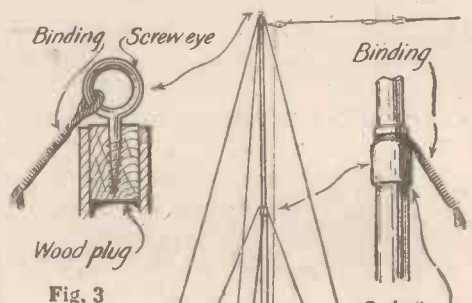


Fig. 3



Fig. 4

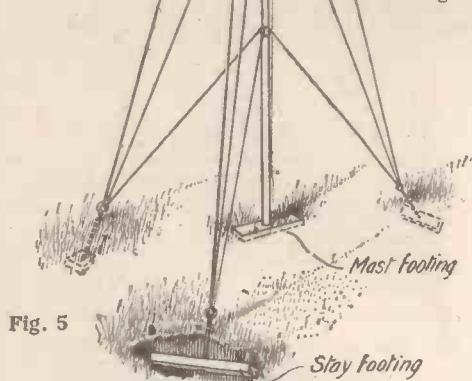


Fig. 5

Fig. 3. Method of securing stay at mast top. Fig. 4. Stay secured round socket. Fig. 5. The complete assembly

The other pieces of wood have 1/2-in. holes drilled right through their flat faces in the middle of each and one of the stay bolts is passed through each hole. Fig. 1 makes this clear. These stay footings must be sunk at least 2 feet below the surface of the ground and the earth well rammed down

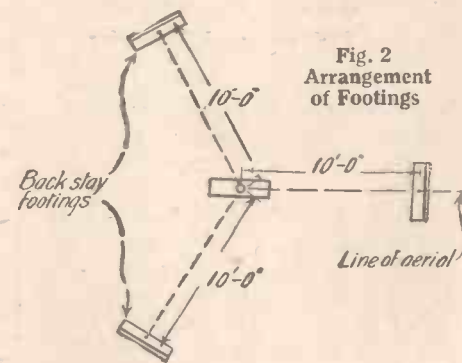
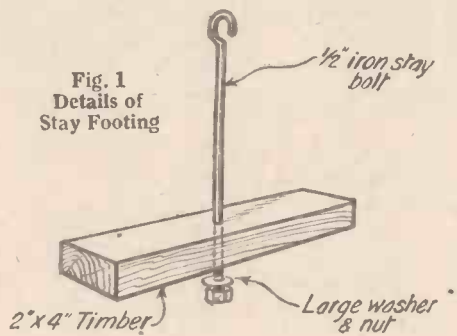


Fig. 2  
Arrangement  
of Footings

Fig. 1  
Details of  
Stay Footing



# MY WIRELESS

Weekly Tips,  
Constructional  
and  
Theoretical—



# DEN

By  
W. JAMES

For the  
Wireless  
Amateur

THE experimenter usually has a number of fixed condensers by him, but sometimes a condenser of the capacity required is not available and it is then that a little knowledge of the results obtained by connecting condensers in series and in parallel comes in useful.

An interesting example that comes to mind may be explained with the help of the diagram. Here there are two aerial terminals and two fixed condensers of .0002 microfarad each. When the aerial is joined to A1 a capacity of .0002 microfarad is included in the aerial circuit but when the aerial is connected to A2 the capacity is .0001 microfarad.

This is because the two .0002 microfarad condensers are then in series. As far as capacity is concerned one .0002-microfarad and one .0001 microfarad condenser might have been used.

### Instability and the Transformer

A receiver having two low-frequency stages, one transformer coupled, provides so much low frequency amplification when modern valves are used, that there may be a tendency for the circuit to be unstable.

Many transformers have a metal case and it used, at one time, to be considered good practice always to join the case to the negative side of the filament circuit. I have found, however, that sometimes the tendency of a circuit to be unstable is increased if this is done. No rule can be given.

Try earthing the case by all means, but be prepared for either worse or better results.

### Modern Valves—and Batteries

Several times recently I have met people complaining of the short lives of their high-tension dry batteries.

Enquiry has revealed that one of the new super-power valves has been used in the last stage with only the same value of grid bias as previously. This is quite sufficient to account for the high-tension battery's short life!

Modern power valves usually pass relatively heavy anode currents. An examination of the characteristic curves, as supplied

by the manufacturers, shows that the modern power valve may pass a current of 20 or 25 milliamperes, which is, of course, beyond the economical discharge rate for most batteries. The difficulty disappears when high G.B. voltage is used. The G.B.

appear to absorb more electricity than others and I have since discovered that from some of them even a third spark which, however, is a very weak one, can be obtained.

### The Outdoor Aerial

A question I am frequently asked is, "What is the best size of outdoor aerial?"

Curiously enough, this question, simple though it may appear, is rather difficult to answer unless one is familiar with the local conditions as well as the type of receiver employed.

It is safe to advise the largest aerial that can be erected when the receiver is a small one comprising, say, two valves and is used principally for the reception of the local station, and when the receiver is used at a place many

miles from the nearest broadcast station.

In these two instances a large aerial will prove satisfactory.

On the other hand, listeners who live within a few miles of a broadcast station and have a receiver providing a fair amount of magnification generally find a medium or small aerial to be better suited to their needs.

### "A METAL AERIAL MAST"

(Continued from preceding page)

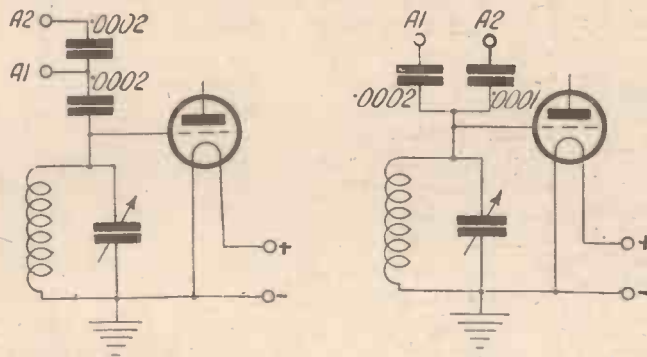
the stays carefully out along the mast so that there will be no entanglement while the mast is erected.

Two adults are the only hands needed to erect the mast, which is lifted up from the top end and pushed into position.

The stays are then handled one by one, the lowest set of stays being fitted with strainers and the bottom section drawn up tight and erect. The second set of stays are then fitted and the middle section adjusted to its correct position.

The top stays are treated similarly, and a final touch on the other strainers secures the mast solidly.

The cleat is best fixed by tapping the iron pipe and fixing with steel screws, but as this is generally found to be rather a difficult job, it may be secured by binding it to the mast with 20 s.w.g. wire.



How to make the most of the Fixed Condensers you have on hand

battery of 9 or 16 volts that used to be considered ample may no longer suffice and the amateur should not hesitate to use 20 or 25 volts when the high tension is sufficient to warrant it.

### Discharging Condensers

A few days ago I needed a 4-microfarad filter condenser for a smoothing circuit, so I went to the cupboard and took one from the shelf only to drop it in a hurry. My fingers had touched the terminals and I had received a smart shock. As I always take care to put the blade of a screw-driver across the terminals of a condenser that has been employed in a relatively high voltage smoothing circuit my "shock" was all the greater.

These condensers store a fair amount of electricity. The snappy spark which one can produce by discharging the condenser is, in itself, a sufficient indication of the fact.

Whether the particular condenser which gave me a shock had been momentarily short-circuited by a screw-driver blade placed across its terminals after it had been used I do not know, but it may have held a charge which was sufficient to produce a second or "residual" spark. Forentire safety it is certainly advisable to short-circuit condensers for a few seconds in order completely to discharge them. Certain types



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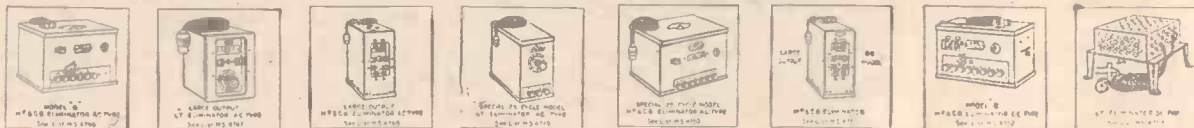
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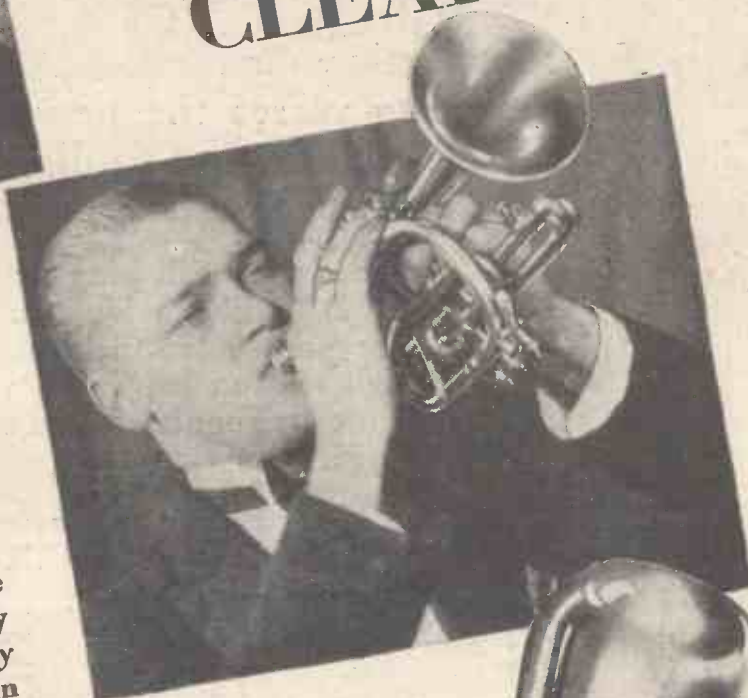
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# On Your Wavelength!

## How is it Working?

AT the time of writing it is perhaps still rather too early to give a definite opinion upon the working of the Brussels Plan, for there are still many stations working on temporary wavelengths and others have not yet succeeded in adjusting their transmitters accurately to the new requirements. It is possible, therefore, that we may hope for an improvement upon conditions as they are at present. I must confess, though, that my own impression of the broadcast band in its present state is not by any means a favourable one. It was a bold experiment to try a 9-kilocycle separation, but it seems that in doing so those responsible have gone just a little too far, though actuated by the best motives in the world.

## Heterodynes

My reason for saying so is that during extensive recent tours over the band I have found the majority of transmissions accompanied by a heterodyne whistle, due to the intermingling of the sidebands of the station that one does not want with those of its next door neighbour that one doesn't. Even 2LO and 5GB have been affected on a good many evenings. With such powerful transmissions one can do something, for if the whistle has been traced to a station on a wavelength above that of the local you can get rid of it without undue loss of signal strength by slightly reducing the wavelength to which your set is tuned. Similarly, if the station below is causing the trouble a slight raising of the wavelength of the receiving set will remove the whistle. But on more distant transmissions this kind of thing cannot usually be done, since there is not a sufficient margin of signal strength to play with.

## Some Difficulties

I am afraid that a good deal of trouble may be experienced with receivers that have been designed especially with a view to quality reception of the local station only, or possibly of the local station and one powerful alternative. It is an axiom in wireless reception that for perfect purity the set must not be over selective. But when you have, for example, next door to the 2-kilowatt 2LO the 4-kilowatt Leipzig, with only a 9-kilocycle separation between the two, you must have considerable selectivity, unless your aerial is somewhere in the neighbourhood of 2LO's doorstep, if you want to hear solos and not duets.

## Leipzig and 2LO

Leipzig, unfortunately, comes through very strongly, in fact, at about thirty miles from 2LO I find that a fair amount of

selectivity is required to silence the German station completely when London is coming in. I should imagine that matters are even worse in the north of England, where Manchester has the powerful Toulouse on the one side and the equally powerful Stuttgart on the other. In the west, Cardiff is almost as unfortunate, having as neighbours Gleiwitz and Breslau, both enormous signals in most parts of this country. What it all seems to come to is that under the present scheme the ranges of stations are enormously reduced if anything like quality in reception is desired, for it is only at a very short distance that you can free yourself from heterodyne whistles.

## A Parallel Case

In the United States there has been a re-allocation of wavelengths which has led to much the same trouble in the form of whistles. One firm of wireless manufacturers has adopted in its latest receiving set an ingenious plan for wiping out the whistle. In the output circuit of the last valve is incorporated a special filter designed to suppress the frequency which produces the whistle. This is all very well

## FOR THE LISTENER—

The modern-style "three" described in this issue. Get next week's "A.W." containing a full test report. The reception log will amaze you!

in its way, but it doesn't exactly make for quality, since that particular note will be wiped out whenever it occurs in a musical transmission, either as a fundamental or as an overtone. It seems to me that we shall have to employ on this side of the "Herring Pond" some such system of power limitation as is in use in the States.

## A Thriller

Through the busy streets of a great town dashes a stolen motor-car, driven by one of the thieves, whilst another sits beside him. The driver elbows his way through the traffic, disregards the uplifted hand of the policeman upon point duty, and brushes aside pedestrians, Baby Austins, and other small objects on the landscape. The man beside him sits screwed round in his seat, watching the powerful police car which is in pursuit. The driver twists, turns, dodges, steps on the gas, but he cannot shake off the relentless sleuths. Suddenly a new factor is introduced into the drama. Whilst the police car halts for a moment, hemmed in by the traffic, a second stolen car flashes

past. The wireless transmitting set is switched on and a message is tapped out to headquarters asking for reinforcements. The pursuit continues. The second police car arrives in a flash. One of the stolen cars is captured; the other is later abandoned by its crew.

And the scene? Chicago? Hollywood? The wild and woolly West? No; dear reader, merely our own London Strand, Fleet Street, and Ludgate Hill. In fact, pursued and pursuers flashed past the end of Fetter Lane, in which stand the offices of AMATEUR WIRELESS. Possibly you did not know that the Flying Squad's cars have radio transmitting sets. Many of them have, and they are found extraordinarily useful for keeping touch with headquarters at Scotland Yard.

## About Fuses

Quite a number of people fit fuses into their high-tension leads; and they are very wise to do so, for these may prevent extensive damage from occurring should a short circuit take place in some part of the set. A very good fuse can be made from an ordinary small flashlamp bulb. But be careful in your choice of the bulbs. A friend of mine recently fixed up one in each high-tension positive lead and one in the negative lead. He was jolly proud of the arrangement—until he came to switch on the receiving set. On flicking over the knob he was greeted by loud howls, and he came running round to tell me that his set had gone mad.

## What Was Wrong

At first sight, there appeared to be nothing wrong with the apparatus; but it was obvious, from what the loud-speaker had to say about it, that there certainly was something very much wrong with it. Then a possibility occurred to me. I screwed out one of the flashlamp bulbs and looked at the figures of voltage and current marked on its base. A simple calculation on the lines indicated by the late Mr. Ohm showed that the resistance of the filament was something pretty high; actually, it worked out to nearly 100 ohms. Now, if you go and stick 100 ohms into your common H.T. negative lead and another 100 into each of the positives, you are introducing enough resistance to cause serious trouble through back couplings in a receiving set of an efficient type. This was just what had happened, and the first of the two L.F. stages was oscillating to beat the band, and so producing those mournful howls. The most suitable bulbs for fuse purposes are the little fellows that you can get rated at 2.5 volts .2 ampere. The resistance of these is only  $12\frac{1}{2}$  ohms, which is not sufficient to do any harm in the ordinary way.



## On Your Wavelength! (continued)

### Watch Your H.T.

The low-impedance output valves that so many of us use at the present time are awfully jolly things, for with proper output circuits they enable a good loud-speaker to do itself justice and bring out both speech and music with wonderful purity. There is, however, one point about them which should always be borne in mind by anyone who uses dry batteries for his H.T. supply; they eat a good deal of plate current. Anyone who does not know what drain his receiving set is imposing upon the H.T. battery should take the first opportunity of measuring the flow. If he does not possess a milliammeter he can generally borrow one from a friend, and the tale that it has to tell may come as a revelation. One friend of mine complained not long ago that he was always having to buy new H.T. batteries; he is—or, rather, was, until this incident—one of those who regarded the standard capacity H.T.B. as the only thing that any reasonable person ever ought to buy.

### A Surprise

I asked him what his set took in the way of milliamperes. He didn't know. Would I bring a milliammeter next time I came round? I would. I did. The instrument registered 20. Now it happens that, as a result of very extensive tests, I am in a position to state definitely that there is no standard capacity battery on the market that will give under such a load more than from eighty to a hundred hours of useful work. The absolute maximum economical load for such batteries is 5 milliamperes, though you may take 6 or 7 out of them for fairly long periods. The bigger the load, the bigger must the capacity be to stand it; and, unless you want to waste money, you should discover what your set is taking and should see that your batteries are suitable for the drain imposed upon them. Generally speaking, if you use a 2,500-ohm output valve you ought to have a battery of the largest cell-size made.

### Organisation Wanted

I have referred previously to the unconscionable delays that only too often occur in the delivery of wireless goods. I do wish that some of our manufacturers and suppliers would really look into their organisations and see whether they cannot improve things, for I am sure that a good deal of business is lost every year in this way. Wanting, the other day, a certain component and being unable to obtain it locally, I telephoned to one of the "big noises" in the firm which makes it, whom I happen to know personally. Could he have the thing dispatched at once? He could. Next morning I duly received a letter acknowledging the order and an invoice;

but the component itself took just ten days to reach me! The wireless industry is now a very important trade in this country, and it is high time that the dispatch departments of firms dealing in supplies should be organised to prevent the occurrence of these absurd delays.

### The Condenser Question

One thing about the new wavelength scheme is that it is likely to settle once and for all the vexed question of tuning condensers. In the past the merits of straight-line wavelength or square-law versus straight-line-frequency condensers have been hotly debated. Though the Geneva Scheme was based on a 10-kilocycle separation, either pattern could be used quite well, since there are very few stations of importance down towards the bottom of the band where crowding is apt to occur on the dials of S.L.W. condensers. At the present time there are many stations worth listening to below 250 metres, and there is no doubt that the straight-line frequency condenser makes it much easier to tune them in and to separate them from their neighbours.

### Remote Control

The ingenious remote-control device, described in AMATEUR WIRELESS a couple of weeks ago seems to have "caught on" in no uncertain manner. Hitherto, the most usual way of switching a set on and off from another room has been to take an extension of the filament circuit with a switch or rheostat at the distant point. Naturally, the resistance of the filament circuit extension was appreciable, and in most cases the result was that the valve filaments were insufficiently heated. Many wireless men have been using one or other of the special relay devices that are on the market, and these overcome the great disadvantages of the old filament extension method. The AMATEUR WIRELESS remote-control unit opens up a new field for the constructor and experimenter. By using a larger commutator and more segments, for instance, the experimenter can arrange his remote control unit for selecting and "making" one of any two or three circuits.

### Luxury!

Really, there is no end to what one can do by remote control. A year or so ago a young wireless man was sitting for an examination and at the same time carrying out a great deal of "DX" work with his transmitter. He was keen on both "jobs" and realised that wireless work done in the early hours of the morning meant the loss of sleep. So he fixed up elaborate remote-control circuits between his bedroom and

the wireless-room, with switches, morse key, receiver, and an alarm clock on a small table by his bedside. He went to bed at a normal hour and set the alarm clock to wake him at three *ack emma*. "B-r-r-r-r-r!" went the bell at three, rousing our hero to great wakefulness and the realisation that he had a busy half-hour's work before him. He turned switches and made contacts, and—hey presto!—generators began to rumble down in the cellar and heavy transmitting valve filaments cast their sickly glow about the wireless-room upstairs. From time to time the transmitter would be "closed down" and he would listen for replies on the receiver at his bedside. Then, promptly at 3.30 he switched everything out, turned over and was once more in the land of dreams.

### The House of Mystery

Carefully remembering to forget my tools, I once more successfully used my plumber's disguise in order to penetrate the B.B.C.'s "House of Mystery" at Clapham. As I entered the portals, I heard the familiar sounds of the grinding of slide rules and sawing of "logs," industries which are carried out by the mathematical section of the Development Department. I noticed a few alterations had taken place since my last visit, such as the provision of a photographic dark-room and elaborate oscillograph gear. Low-frequency tuning notes squeaked up and down the scale in the testing-room, where special work was being carried out on amplifiers and loud-speakers. By the way, it's about time the B.B.C. gave broadcasts of these calibrating signals; the ordinary listener would then be able to judge how good his set is as regards response and reproduction of the musical frequencies. The more advanced amateurs would be able to take measurements and curves. Such data would enable one to improve the quality of reproduction: resonances and other defects would be eliminated one by one until the "curve" was a straight line.

### Carry On!

Meanwhile, good work is being carried out down at Clapham. Better liaison between the Research and Development Departments, and other sections of the engineering side of the B.B.C. has been obtained by the carrying out of many experiments "on the job" in addition to in the laboratory. Outside broadcast and station maintenance engineers are kept informed of activities by means of a monthly bulletin containing reports of all experiments carried out. Everybody is interested in the improvements which are being made almost every day to the B.B.C. transmissions. Carry on the good work, research engineers!

THERMION.

**READ  
THE WIRELESS MAGAZINE  
MONTHLY, 1/-**



# Making for Cones



By G. E. DOVASTON, B.Sc.

IT is an undisputed fact that the popularity of the cone speaker is now well established, and many amateurs are experimenting with this type of instrument.

It has been found that there is no "best" size or shape or thickness of cone for all types of operating units, but that each type of unit is suited to a particular description of cone. Also, with two equally good receiving sets, one type of speaker may suit one set better than the other, so that, for good results from both sets, different speakers may be desirable.

With a given receiving set and loud-speaker unit it remains therefore to find the best kind of cone to suit both.

This is best done by trial and error, which involves the construction of several different shapes and sizes of cones, and it is the object of this article to assist the constructor in making these up.

### Cone Dimensions

The dimensions of a cone are best expressed by the apex angle and the diameter. As is well known, the "development" of a cone is a circle from which a segment has been cut out, and in order to make a cone with a given apex angle and diameter we require to know with what radius to strike our development circle and what angle in degrees to cut out.

To calculate this requires a knowledge of trigonometry, and it becomes tedious when the calculation has to be made several times. The two charts, Figs. 1 and 2, have been drawn to enable anyone to set out at once the required radius and angle of sector to make a cone with any required apex angle and diameter. They are operated as follows:

Let us assume that we desire to make a 10 in. diameter cone with an apex angle of 90°. Referring to Fig. 1 we put a pointer at 90° (the required apex angle) and run up vertically until we strike the curve. From this point we run horizontally to the left and read off this height on the vertical scale, which comes, in this case, to 10.5°. This is the angle of the sector which must be cut out. Referring to Fig. 2 we place a

pointer on 90° and proceed as before, and we read off on the vertical scale that the ratio

$$\frac{\text{Radius of Development Circle}}{\text{Diameter of Cone}}$$

is .71. Thus, since the required diameter of the cone is 10 in., the required radius of development circle is 7.1 in. Had the required cone diameter been say 14 in. the

units from cones with dimensions outside these limits.

Difficulty is sometimes experienced in persuading a cone to remain truly conical after the glued joint has set. There are two ways in which this trouble may be obviated.

One method consists in making the cone with a "turnback" as in Fig. 3. The depth of turnback is usually best at from 1/2 in.

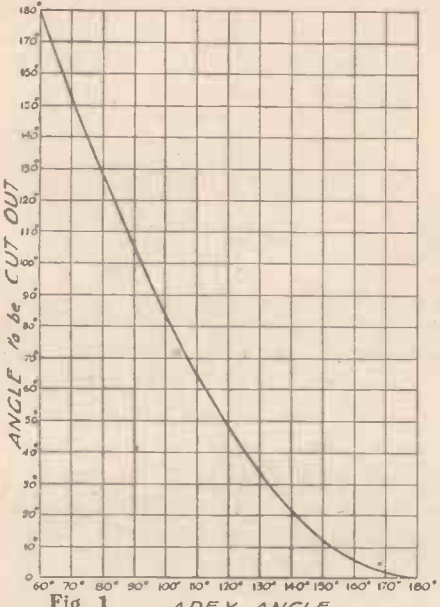
to 1 in. and it is very easily made. Before bending up the cone draw a circle just inside the edge, its distance from the edge depending upon the depth of turnback required. Get a knife and half cut through the paper round this line and coax a bend in the paper at the line all round so that the cut is opened by bending. It will then be found that as the cone is closed up, so will the turnback bend up. This will make the cone more rigid at the outside and make it much more inclined to "sit down square."

The other method to ensure ultimate symmetry consists in the method of making the cut. Usually the cuts are radial with, of course, a suitably arranged parallel overlap for glueing. This makes a strip of double thickness at one side of the cone which is apt to distort the shape.

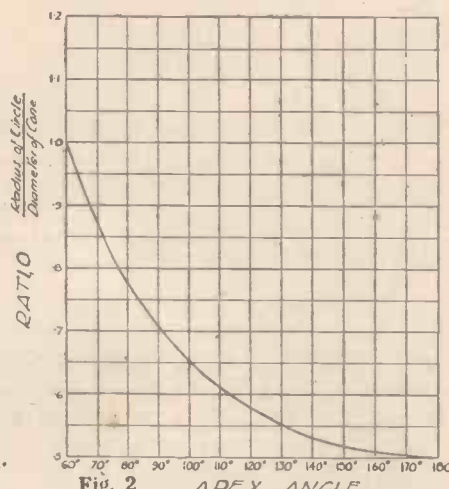
If, however, the cuts, instead of being radial straight lines, are curved, as shown in Fig. 4, the strip of double thickness produced by the overlap is not confined to one line on the cone, but is distributed round it, thus avoiding local distortion.

It is quite easy to set out these curved cuts. The straight radial lines are set out as before at the required angle obtained from Fig. 1. Set your compasses with a radius slightly greater than one half the radius of the outside circle and, with the centre on each of the radial lines, describe an arc commencing at the centre point of the outside circle and continuing outwards to the edge. These arcs represent how the paper would have to be cut if we were making a "butt" joint.

(Continued at foot of next page)



These two charts will enable you to set out a cone of any angle and diameter



corresponding radius would have been 14 by .71 = 9.9 in.

It will be seen that any shape of cone with an apex angle from 60° to 180° (a disc) can be at once set out with the aid of the two charts.

The writer has made up a large number of cones of different sizes and shapes and a few practical hints follow which are the result of personal experience. Generally

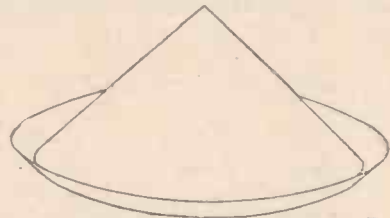


Fig. 3. Cone with turnback

speaking, the sharper the apex angle and the smaller the diameter, the higher the "pitch" of the speaker and, conversely, the flatter the apex angle and the larger the diameter, the lower the pitch. It will be found that the practical limits for these

## For the Newcomer to Wireless: OUTPUT VALVES

A SHORT time ago you told me what a power valve was. I remember you explained that this kind of valve is designed to deal with a bigger volume without introducing distortion. I wish you would tell me a little more about output valves.

What are the points that are puzzling you?

First of all I find that there are at least three classes of output valves, all of them called power or super-power valves.

You mean that some have an impedance of 6,000 ohms, others of 2,500 and others again of only about 1,500.

Exactly, but I am wondering how they ought to be used.

It depends mainly upon the volume that you wish to obtain from the loud-speaker without distortion.

How is that?

The greater the volume of sound the lower must be the impedance of the output valve.

I don't quite follow.

To obtain a big output from the loud-speaker you must apply respectable grid voltage swings to the grid of the last valve.

Yes, I see that.

Then clearly if loud-speaker reproduction is to be undistorted the valve

must be able to handle the input properly.

I follow that.

The 6,000-ohm type of power valve won't as a rule take more than  $7\frac{1}{2}$  volts negative grid bias with a reasonable plate potential. This means that if the "upper" halves of incoming waves make the grid more than  $7\frac{1}{2}$  volts less negative and the "lower" halves make it over  $7\frac{1}{2}$  volts more negative, distortion will arise through a flow of grid current in the one case and bottom bending in the other. In other words, what we call a 15-volt grid swing is the very utmost that such a valve can deal with.

That sounds a good deal.

It isn't really. It may be quite enough to allow for good loud-speaker reproduction in a small room. In a bigger one where more volume is required, you will find a rather curious effect.

What is that?

The greater part of the reproduction may be pleasant enough, but whenever loud passages or certain musical notes or certain speech sounds occur distortion will be obvious.

Just why?

Because very big grid swings may be produced when these occur.

I see. Then you mean that for really

good reproduction a valve must always be able to deal with a much bigger grid swing than normally comes its way?

Exactly. The 2,500-ohm valve with a fairly high plate voltage may take up to 20 or more volts grid bias, allowing for a 40-volt grid swing.

Surely that is enough!

For medium-sized rooms it is, but it will not do for large ones. Here we have to call in the very low impedance valve with a high plate voltage and a large amount of negative grid bias. But don't imagine that you will immediately get wonderful results if you substitute a lower impedance output valve for the one that you are using at present.

Please explain.

To give the best working, an output valve requires a suitable impedance in its plate circuit. Hence unless the impedance of your loud-speaker is made to match that of the valve your reception will not be first-rate.

Does that mean that you want a special loud-speaker for each valve?

No. You can match the two by using a properly designed filter circuit or better still you can fit a tapped output transformer which will enable you to suit the primary to the valve and the secondary to the loud-speaker.

## "MAKING CONES FOR CONE SPEAKERS" (Continued from preceding page)

To allow for overlap for glueing, each of these arcs is supplemented by another arc, say  $\frac{1}{4}$  in. larger in radius and the paper is cut along the two arcs shown as heavy lines in Fig. 4. The arcs remaining on the paper serve as a guide for the amount of overlap when glueing.

An extremely satisfactory cone can be made with a combination of turnback and curved cuts.

### Paper Thicknesses

The writer has found that the most satisfactory adhesive to use is Seccotine. This should be applied along both overlapping edges, rubbed well in with the finger, and allowed partially to dry for some minutes before the joint is made. It will be found that then a strong joint results almost at once and the cone will be ready to test in a very short while.

Experiments can also be carried out with cones of similar dimensions, but made with varying thicknesses of paper. That known as "cartoon" paper, procurable from any art dealer, has been found most successful, although this may be a trifle too heavy for some types of unit. Its thickness is about .0015 in., while paper as thin as .0006 in. has been found satisfactory in some cases.

It is recommended that, in making comparative tests of cones, one dimension only should be altered at a time. For instance, two or more cones should be

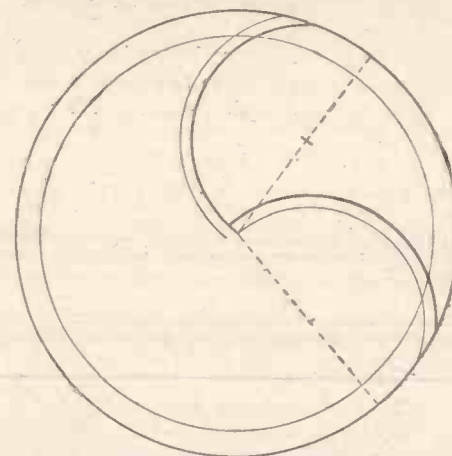


Fig. 4. Diagram showing method of cutting diaphragm

made up with the same diameter with different apex angles, two or more with the same apex angle with different diameters, and so on. By this means definite data can be obtained as to the effect of a change in one dimension or

the quality of reproduction, which could not be obtained by haphazard methods. It is also desirable, when approaching optimum results, to obtain the opinion of more than one listener on the relative merits of the two or three better types of cone produced.

It may also be found that one type of cone is most suitable to one type of reproduction—speech, for instance—while another is best suited for orchestral reproduction. In the case of one having two units available, greatly superior results can often be obtained by running both simultaneously off the same receiving set. It may then be found desirable to fit each unit with a cone of different characteristics in order that the combined effect produced shall be uniformly good on all types of broadcast.

A regular wireless telephone service between Holland and the Dutch East Indies was officially opened on January 7.

Within the next few weeks both Hilversum and Huizen (Holland) will establish a regular service of picture transmissions; the former station will operate the Danish Brum-Pedersen apparatus, Huizen having arranged to adopt the Fultograph system.



# What depth in the Bass-

when you hear it on  
the silent background

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This Super Lissen Transformer is made in two ratios,  $3\frac{1}{2}$  to 1, and also  $2\frac{1}{2}$  to 1. The  $3\frac{1}{2}$  to 1 is suitable for use in either the first or the second stage of an L.F. amplifier, or can be used in cascade for both stages, and with practically any valve. The  $2\frac{1}{2}$  to 1 transformer is suitable for use after a high impedance rectifier valve without fear of distortion or loss of high notes and overtones. The price is the same for both ratios. **19/-**

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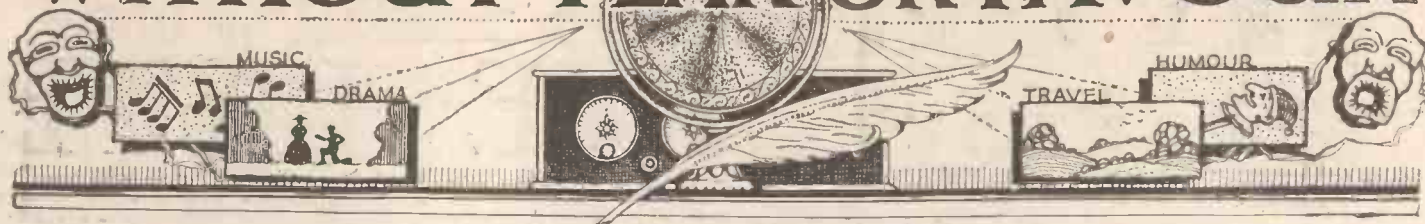
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NIGHTINGALE SPEAKERS



# WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

MY recent notes on Cecil Lewis's play have brought me in a number of interesting letters from which I quote the following:—

"Allow me to congratulate you upon the stand you are taking against 'smut' creeping into the wireless programmes. As a father of growing children, I very much object to it. Pray continue the good work, I enjoy the very fair comments you make in AMATEUR WIRELESS week by week. They are always unbiased."

M. B. (Westcliff-on-Sea).

Another letter, from a correspondent writing from Prince's Gate, is equally important:—

"I have not the pleasure of knowing you, but have the advantage of reading your weekly comments in AMATEUR WIRELESS; and I admire the stand you take for clean wireless transmissions.

"It would indeed be a public misfortune if this new feature of the domestic life of most households in the country could not be relied upon to maintain the ordinary standards of good taste (and decency) observed in ordinary British families—and should operate to depress them instead of raising them.

"There is so much clean fun in life that one feels it a sign of intellectual bankruptcy to eke out humour with suggestions of filth; and one expects the B.B.C. to exercise more care and supervision in so simple a matter as the provision of wholesome instead of tainted fare.

"As you point out, it is not merely the 'humorist' that is guilty of lapses of taste. It is intolerable that serious plays should be marred by them.

"I am no squeamish 'purist,' but a middle-aged man of the world and the father of a family. In both capacities I like your crusade and your pluck in carrying on. The public is your debtor."

F. E. S.

I have often wondered why the daily newspapers have not published a non-technical radio criticism, and this wonderment is shared by the B.B.C. I have never published the letter, but AMATEUR WIRELESS received a tribute from Savoy Hill as being the pioneer paper in this respect. I was therefore interested to get a letter from a colleague who is going to conduct

a wireless column of criticism in one of the northern papers.

He writes me: "Would it be a breach of etiquette to ask your advice, and if possible assistance? I write because I believe that your position in the wireless world is established and you yourself sufficiently at the heart of affairs to be able to give me your opinion."

Of course, I have put him on the right lines and wish him luck. The more open criticism of wireless programmes we have, the better for all concerned.

*Clothes Props* was not so preposterous a programme as it was announced to be. Was it *Clothes Props* I really heard? At any rate, there was some fine singing, and one is left wondering why it is necessary to have to whet the curiosity with such titles.

In this connection, it is coincidental that I have received a protest from a reader against the B.B.C.'s habit of giving a very ordinary revuette a high-falutin' name and passing it on to us as "something unusual and brilliant," etc. *Clothes Props* was accorded a lot of space in the official programmes and—guileless and gullible person that I am—I took it all in and cancelled an invitation in order to stay indoors and hear this masterpiece. *Clothes Props* proved to be a very ordinary and everyday wireless revue—entertaining, no doubt, but not deserving in the least the praise

given it beforehand. In fact, it would have been almost dull had it not been for Stuart Robinson and the Gershom Parkington Quintet. The former has a fine voice, and the latter are versatile and bright. There is a little slogan about "Truth in Advertising." I commend it to the "Powers that Be." Quite right, my friend.

Alice Vaughan has a nice voice, but her intonation is somewhat mournful. I suggest that she either alters the expression of her singing or else chooses brighter songs

Another sombre singer is John Buckley. He, too, would be far better to listen to if he got rid of that funeral note. I was struck by this quality in him when I heard him in person not long ago, and I realise that over the ether his tendency to drag and quaver quite spoils his otherwise splendid singing.

Regarding banjo solos, Tarrant Bailey, jun., is one of the best performers on this instrument I have yet heard. Nevertheless, I do not regard his type of performance as ideal radio entertainment. Despite clever fingering, even the costliest banjo has a sort of "untuned" twang about it which becomes, after a while, painful to the musical ear. It isn't so bad if the tunes played are quick and jolly, but Tarrant Bailey tried out one or two "arty" tunes, and they were not pleasant.

"Harold" again:—

"Alle Menschen müssen sterben." "Erscienen ist der herrlich Tag." "Ah! wie flüchtig. Ah! wie nichtig." Day in and day out for a whole week! Did anyone ever hear (apart from the titles) such miserable stuff with such appalling frequency? I tried to settle down and understand it one night, but after a time my hand strayed to the dial and I went over to 5GB.

Always ready to learn, I pay particular attention to the announcers with "refined" accents. I get somewhat muddled, however, when a certain band announcer follows the awfully correct foreign accent of the official announcer with: "We 'ave jus' plide Brahms' 'Ungarian Darncé number fower." I found myself mixing the two sorts at Lady Wonderful's the other night.



Emma Halg—an impression





LAST week a preliminary announcement of the "Listener's Three," the blueprint for which forms one of the subjects of our great free gift this week, gave a full account of the set's capabilities. It is, however, opportune to repeat that this special set has been developed by Mr. J. Sieger, the chief of our Constructional Staff, in conjunction with the AMATEUR WIRELESS Technical Staff, as a result of the demand for receivers which are as efficient, if not even more so, than the average, and yet which are ultra-compact.

### Special Features

Compactness is the first obvious feature of the "Listener's Three," for all the components associated with this efficient set are housed in a cabinet measuring only 7½ in. by 8½ in. by 10 in.

Efficiency is the second chief feature, for the circuit incorporates a screen-grid H.F. stage, a novel and particularly satisfactory method of coupling the H.F. valve to the detector stage, and finally an efficient L.F. stage.

Simplicity is the third feature, for, apart from a midget reaction control on the panel, which in practice is little more than a control over volume and selectivity, the whole tuning operation is carried out with one knob, the aerial and H.F. tuning circuits being ganged.



Compactness is the Key-note of this Set

## For the Listener's Speaker !

# "THE LISTEN

## IDEAL FOR THE HOME

Two things have conspired towards the success of this receiver, and have made it perform so satisfactorily that there was no hesitation in selecting it as the subject for a bumper issue of AMATEUR WIRELESS, and for our free-gift blueprint. The circuit was chosen with particular regard to amateur requirements, and the layout of the set has been arranged with strict regard for theoretical niceties. One cannot afford to take risks when trying to "squeeze" a screen-grid H.F. stage into the small dimensions as accomplished in this instance !

### The Circuit

A glance at the circuit diagram will interest those who are making up the set and want to know all about its technical whys and wherefores. Those not accustomed to reading theoretical diagrams will have little difficulty in tracing out each component, for the metal screen can be easily identified, together with the screen-grid H.F. valve, part of which projects through the screen to the detector side. Reference to the photographs and blueprint will show that this is just how

the H.F. valve is arranged in practice.

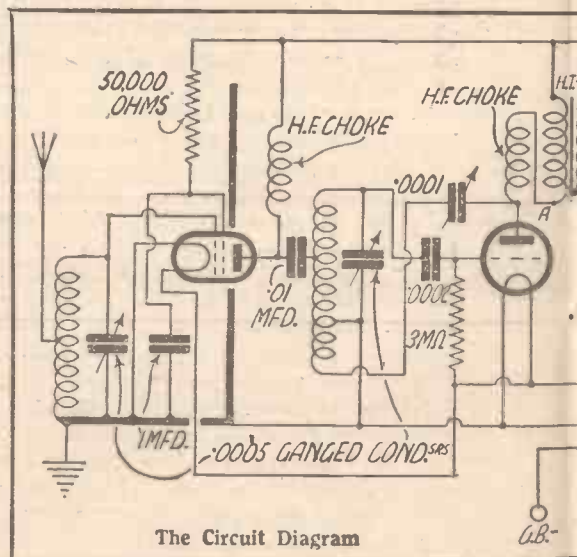
Start at the business end of the circuit, at the aerial tuning arrangements.

The aerial coil is a single-winding job (full constructional details of this and the H.F. coil will be given next week) and the aerial is taken to a tapping at the bottom end. This is to ensure the best selectivity.

The H.F. valve is of the latest type with the anode terminal at the "pip" end of the bulb, and its

screen-grid voltage is obtained from the common H.T. tapping via a fixed drop-voltage resistance of 50,000 ohms. To prevent H.F. instability a 1-microfarad fixed condenser is connected between the screen-grid and earth.

H.T. reaches the plate of the H.F. valve through an H.F. choke, and the H.F. signal currents prefer the easier path through a .01 microfarad fixed condenser to a tapping on the H.F. coil. Notice how this arrangement differs from the normal tuned-anode



The Circuit Diagram



# ER'S THREE"

## THE SUBJECT OF ONE OF OUR FREE BLUEPRINTS



a small knob on the panel, just below the main tuning control.

### The Layout

The layout is even more interesting to the practical man than the circuit. The distance between the panel and the screen is only 3 in., yet in this small compartment are housed the aerial coil and condenser, the H.F. valve holder, the 50,000-ohm resistance in series with the screen-grid, and the earthing condenser. Note here that panel brackets (quite small ones) are used to keep the whole construction rigid, and that the floor of the H.F. compartment (that is, the part of the baseboard between

the panel and the screen) is covered with copper foil. This in conjunction with the vertical screen, ensures complete immunity from stray capacity.

On the detector and L.F. side, which embraces the whole of the baseboard to the rear of the vertical screen, we have the valve holders for both these stages, the L.F. transformer, grid leak and condenser, H.F. coil, two H.F. chokes, H.F.-to-detector coupling condenser and the reaction variable condenser.

With the aid of the free blueprint enclosed with this issue constructional operations can be started at once. First drill the panel and terminal strip, using the blueprint as a template. Note that the panel and strip are obtained by cutting the 2-in. strip from the 9 in. by 6 in. panel, this being a standard size. This, of course, leaves the 7 in. by 6 in. panel. Do not, however, mount

everything on the panel, for it is necessary to leave the ganged condensers till a later stage when some of the wiring has been done. The terminal strip may be completed, however, and this carries an on-off switch for the filaments of all valves, and six terminals for H.T. positive, L.T. positive and negative, loud-speaker positive and negative, and grid-bias negative. It should be explained that the L.T. negative terminal is also used for the H.T. negative and grid-bias positive connections.

The terminal strip can be screwed to the rear edge of the baseboard, and it is quite a good plan at the start to place all the parts on the baseboard in order to get a general idea of the layout. Some of them may be screwed in position right away.

For example, most of the components on the detector and L.F. side may be permanently mounted. The valve holders for the two valve stages and for the H.F. coil, the two H.F. chokes and the L.F. transformer can be fixed in place, as can the copper foil screen on the front part of the board against the panel. The foil, which can be quite thin, should be laid flat and attached to the board with small nails.

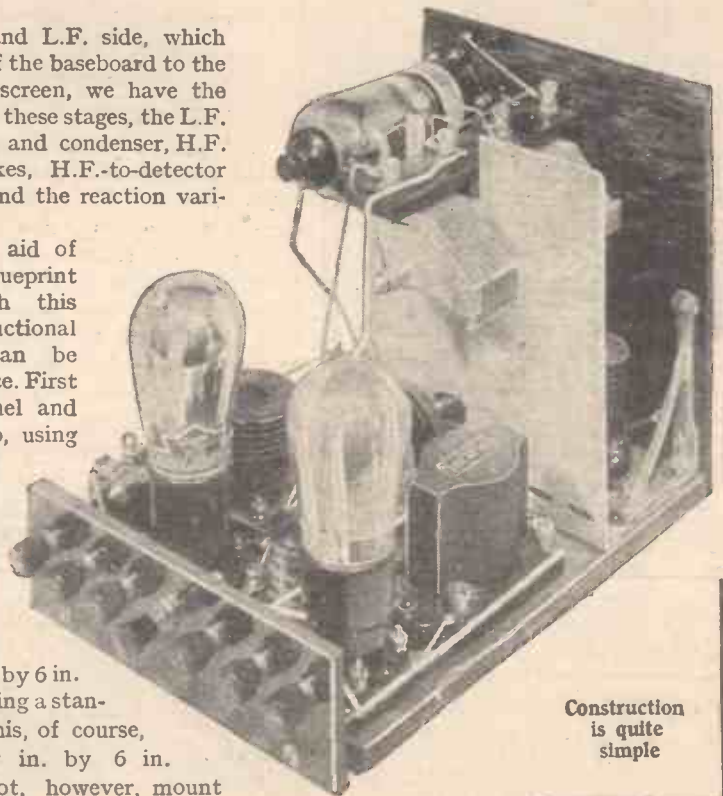
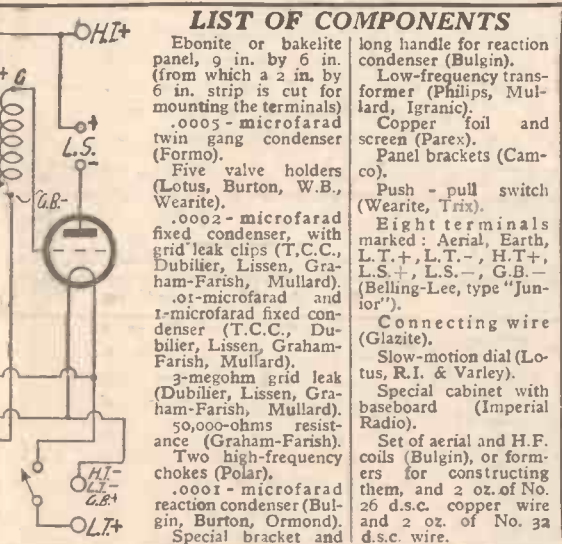
On the panel may be mounted the aerial and earth terminals, and the H.F. valve holder on the reverse side. The panel brackets can also be attached.

On top of the foil are mounted the fixed



circuit. It has the great advantage that the lower end of the H.F. coil is earthed and this is a particular merit in view of the ganging arrangement adopted.

One side of both aerial and H.F. tuning condensers is common and there is thus no danger of capacity or loss effects being caused by ganging these two variable condensers on one shaft. The reaction midjet condenser is on the detector and L.F. side of the set and its control spindle is carried through the aluminium screen to



Construction is quite simple



“THE LISTENER’S THREE” (Continued from preceding page)

condenser connected to the screen-grid and the valve holder for the aerial coil.

Wiring

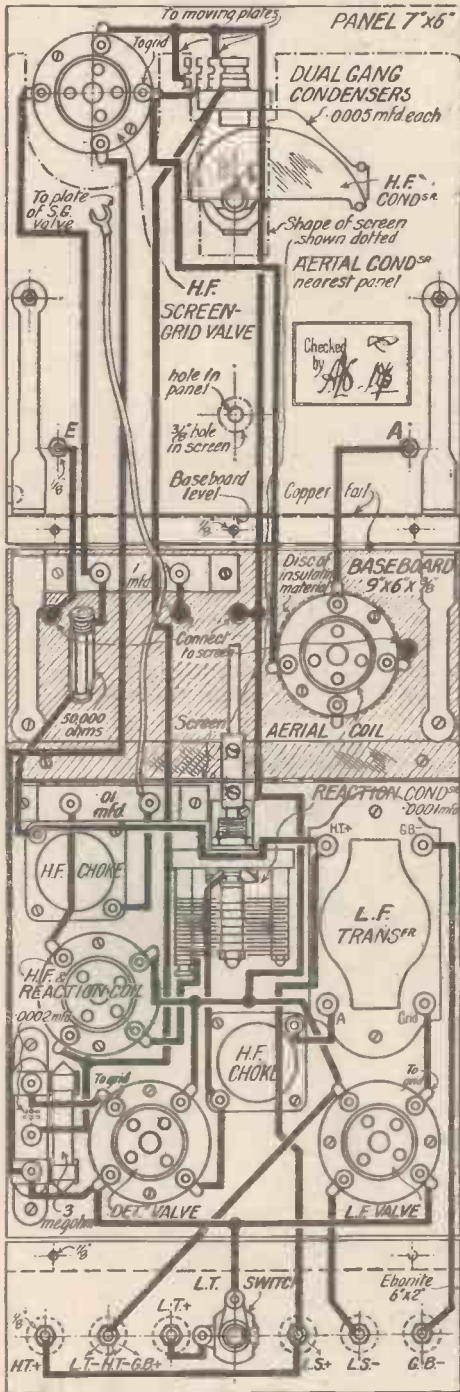
Thin insulated wire, such as Glazite, is recommended for wiring up, since even if two wires are wrongly spaced and should

obvious that the whole of the wiring cannot be completed in one operation, and as the process progresses each added wire should be marked off on the blueprint.

The wires near the panel should be attached first of all, and when all the available components are connected the ganged condensers and vertical screen should be added. This will give the opportunity to complete the wiring on the tuning and H.F. side.

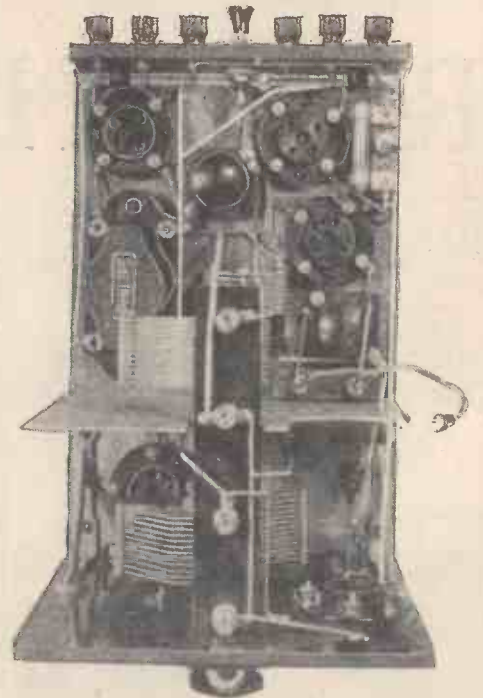
As much as possible of the wiring in connection with the detector stage should be completed before adding the reaction condenser on its right-angle bracket. This component may need a little careful positioning with respect to the holes in the vertical screen and panel, but if the blueprint has been strictly adhered to when drilling no trouble will be experienced.

If the components have been mounted in the order described it will be seen that there still remain the .01-microfarad coupling condenser and the grid condenser and leak to be placed *in situ*. The coupling condenser can conveniently be mounted close to the screen when the reaction variable condenser is mounted and wired up, and the grid condenser and leak can be added when most of the short wiring in the centre of the baseboard is complete.



Reproduction of Free Blueprint

touch there will not be a short circuit. The blueprint should be used as a wiring guide, for it will facilitate matters even for those who are skilled enough in constructional work to wire up direct from the theoretical circuit diagram. In this particular case it is



The Layout is shown clearly by this photograph

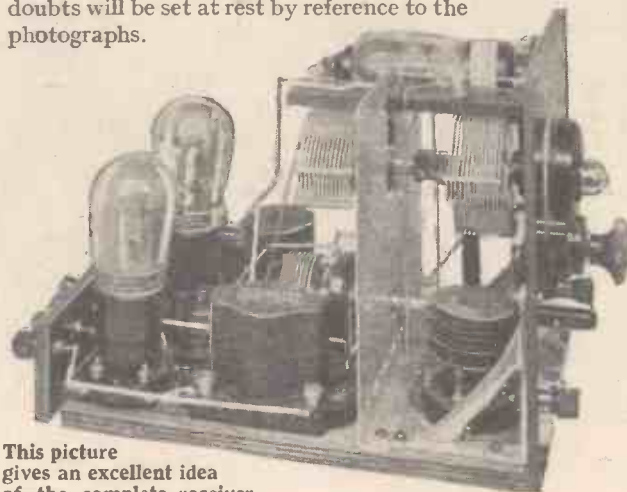
Not only must each actual wire be checked, but it is wise to see that all contacts are good. For instance, the soldered joints to the screen on the floor should be examined carefully, and it should be ascertained that the vertical screen makes good contact with the copper foil on the base. A soldered contact is not necessary, for it will be sufficient if the flange of the vertical screen is clamped tightly down on the foil.

It will be seen from the photographs and blueprint that special “midget” coils are used both in the aerial and H.F. stages. Full details of these will be given next week, though they may be purchased ready wound and made up if so desired. London listeners can conveniently see the original of this receiver in the Somerset Street windows of Messrs. Selfridge & Co., Ltd., and this may be a help to those who are making up the set, but would first like to see just what it looks like!

WHAT DO YOU THINK—

of the “Listener’s Three” and the “Listener’s Loud-speaker”? If you are making up either or both make sure of Next Week’s “A.W.” for final details.

The whole of the wiring is not really complicated, and the job of checking it when complete should be quite a straightforward one if again the blueprint is used. Everything has been done to make this show the actual positions of the wires, which should be followed closely, but any doubts will be set at rest by reference to the photographs.



This picture gives an excellent idea of the complete receiver

Considerable alterations have been made to the Radio-Toulouse studio in anticipation of the increased power shortly to be used. It is also reported that the Juan-les-Pins-Nice transmitter is to become a 5-kilowatt so that the publicity broadcasts made from the local casino may be heard at greater distances.



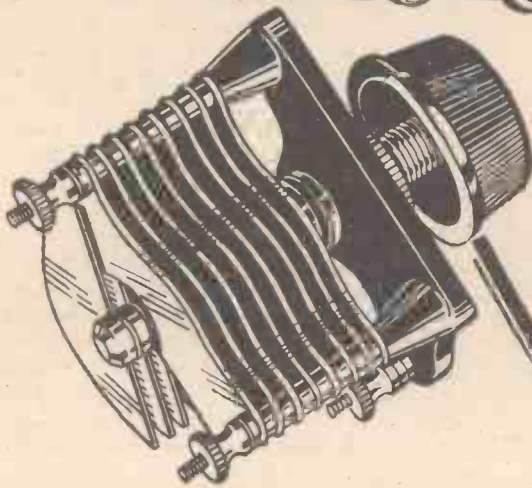
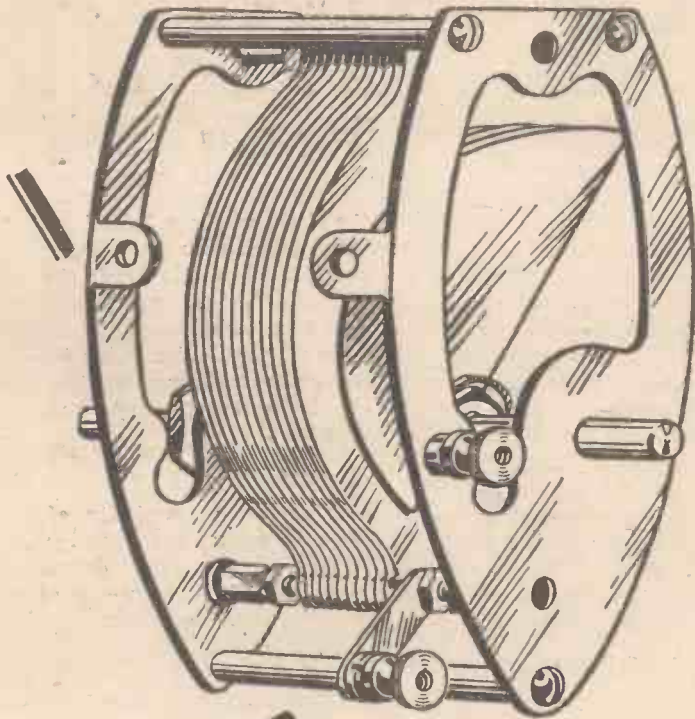
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# DO HENRIES VARY?

In this article our Technical Editor explains the differences in the performances of low-frequency chokes

ONE of the most variable quantities in use in wireless circles to-day is the Henry. Any reader who has read with any care, articles or advertisements regarding low-frequency chokes cannot fail to have been impressed by the apparent diversity in the inductance of chokes which appear otherwise to be equivalent. It is no uncommon thing to find two chokes selling at much the same price, one of which has a very much greater inductance than the other, or conversely we may find two chokes both rated at the same inductance, one costing much less than the other.

This is apt to cause some perplexity. The Henry is a fixed and definite unit of inductance. Yet a test made on two chokes rated at quite different inductances will often reveal practically no difference between them. So marked is the discrepancy that one is tempted to think that there must be more than one brand of Henry! This suggestion, of course, is ridiculous; but this is virtually the truth, owing to the lack of definition which abounds to-day.

## Varying Inductance

The fact is that inductance of an iron-cored choke is not by any means a constant quantity. There are various factors at work which cause the inductance to depend essentially upon the conditions under which it is measured. Perhaps the importance of this point would be more appreciated if one said "used" instead of "measured," for the conditions under which an inductance is employed in modern circuits are widely variable. This variation in inductance, therefore, is not merely of academic interest, but affects the results which will be obtained from the choke in actual use.

One of the principal causes of variation in an iron-cored inductance is the polarisation of the iron due to the direct current passing through the winding. Almost every iron circuit employed in wireless work is polarised in this manner. In the case of a choke coil, the direct current passes through the same winding as is carrying the alternating current. For example, we may use a choke in a smoothing circuit of an eliminator, in which case there is the steady D.C. load from the

eliminator which must pass through the choke as in Fig. 1. If the choke is used in the anode circuit of a valve, as, for example, in a choke output circuit, we have the steady anode current in addition to the alternating currents present in the winding of the choke. In a transformer we again have the polarisation of the iron, due to the

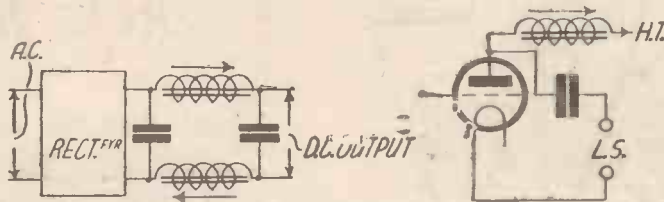


Fig. 1. Two cases where D.C. and A.C. flow through a choke simultaneously

anode current passing through the primary winding.

## Effect of Iron Core

The inductance of a coil without any iron circuit depends upon the square of the number of turns and upon the shape of the coil. This latter factor comes into play because the magnetic field is not concentrated in the centre of the coil, but is distributed over a somewhat wider area, in consequence of which there is a rather high proportion of magnetic leakage. When we insert an iron core in the centre of the coil we tend to concentrate all the magnetic

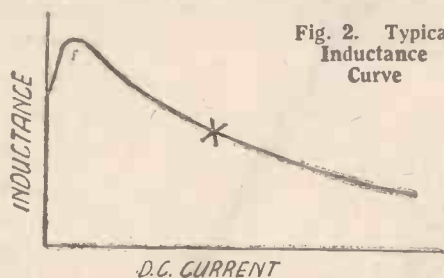


Fig. 2. Typical Inductance Curve

field within the iron itself, so reducing the magnetic leakage very considerably.

Now, the iron "collects" the magnetic field in this manner, due to the fact that it has a lower magnetic resistance or reluctance, to use the correct technical expression. Just as more current will flow in a circuit of low resistance, so more magnetic flux will flow in an iron path of lower magnetic reluctance. The inductance of an iron-cored choke, therefore, depends purely and simply upon the square of the number of turns and upon the reluctance of the iron

circuit, the shape of the coil having little effect. Not only does the iron concentrate the magnetic field within itself, but it greatly increases the strength just as the substitution of a low resistance for a high resistance in an electrical circuit will give rise to a large increase in current. The iron is said to have a greater permeability than air.

## Permeability

Now the permeability of the iron is not a fixed quantity, but depends upon the degree of magnetisation. If we pass no direct current round the winding, then the only magnetisation is that produced by the alternating current flowing through the coil. If, on the other hand, we pass a steady current through the coil, we produce a certain steady magnetic effect, and any effect produced by the alternating current is superposed on top of this. Thus, the varying conditions under which the choke is used impose different conditions upon the iron circuit itself. If we make a test we find that, as a steady current is passed round the winding, the iron rapidly reaches a sensitive condition under which circumstances the inductance of the coil may be as much as 1,000 times as great as the inductance without the iron circuit. In fact, with some of the special alloy steels now being used, the increase is even greater, the figure rising to 2,000 or 3,000. This condition of affairs, however, does not last very long, for as the polarising current through the choke is increased, the permeability of the iron falls off at a somewhat rapid rate.

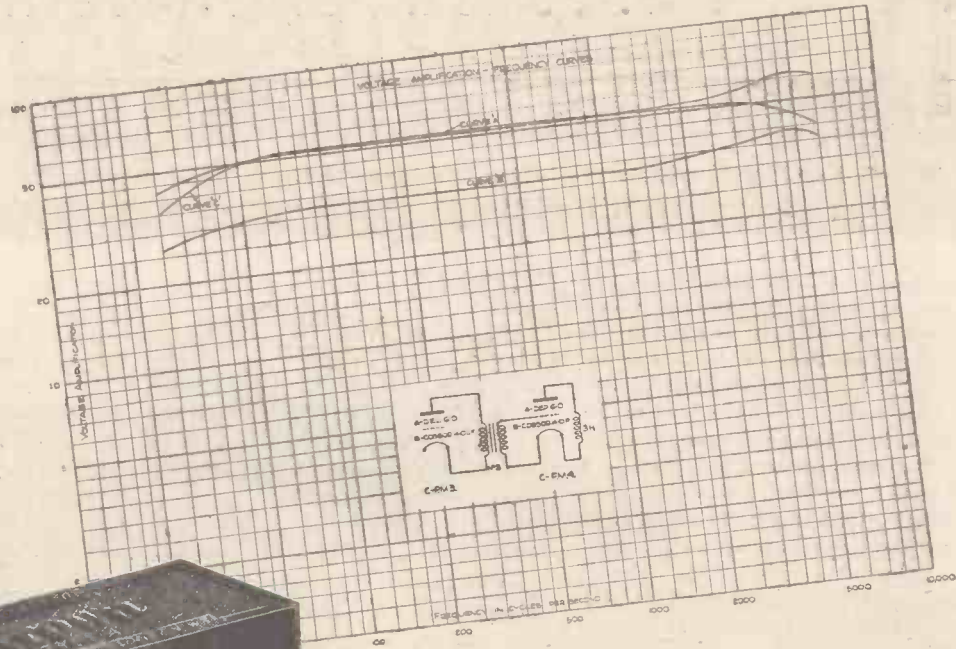
Now to operate the choke on the first portion of the curve where the permeability of the iron is approaching a maximum is not economical. It would involve very large chokes and would be quite uncommercial, under ordinary conditions. Practically every choke or transformer, therefore, is operated on the second portion of the curve where the permeability of the iron is continually decreasing as we increase the steady current through the winding.

The consequence is that the inductance of the choke is not anything like constant, but varies with the steady current in a manner such as that shown in Fig. 2. The normal operating position of such a choke could be in the region marked x.

(Continued on page 199)



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# "A.W." TESTS OF APPARATUS

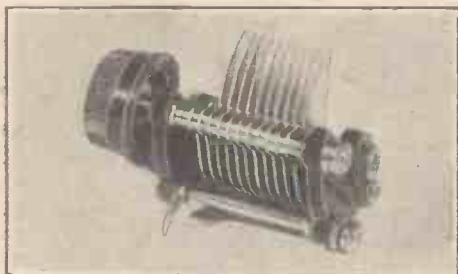
Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

## Burton Midget Reaction Condenser

ALTHOUGH there is a very large number of variable condensers from which the constructor may choose, there seems to be a scarcity of midget reaction condensers. This is surprising since these components are quite up to their work and are extremely handy in use.

C. F. and H. Burton, of Progress Works, Bernard Street, Walsall, have sent us for test one of their midget condensers designed primarily for reaction control. This is a neat component soundly constructed. The overall length from knob to terminal is 3 in. while the overall breadth with moving plates fully out is only 2 1/4 in.

Two insulated end plates serve to hold the fixed plates in position and form



Burton Midget Reaction Condenser

bearings for the rotating spindle. Friction contact is made between the moving spindle and a terminal mounted on one of the end plates. Distortion of the plates due to rough handling of the condenser is almost impossible due to the robust design.

On test we found that the component had a minimum capacity of 11 micro-microfarads and a maximum capacity of 101 micro-microfarads. This is a satisfactory range for most circuits utilising a condenser reaction control.

## Gecophone Super-capacity H.T. Battery

MOST broadcast listeners require good and faithful reproduction above any other quality possessed by their wireless sets. That good reproduction is not often achieved is due, in the majority of cases, to the fact that in order to obtain a reasonable loudness of reproduction the last valve is overloaded.

The use of power and super-power valves in the last stage is only effective when a reasonably high voltage and anode current can be obtained from the high-tension batteries.

To meet the demand for a large-capacity battery, the General Electric Company, of Magnet House, Kingsway, W.C.2, have produced a Gecophone super-capacity

battery, catalogue No. L4903. This battery consists of six 8-cell units housed in a strong cardboard container measuring



Gecophone Super-capacity H.T. Battery

11 1/4 in. by 8 1/2 in. by 3 3/4 in. high. Each unit has a central tapping point with terminals at the ends; brass connecting strips connect unit to unit. The makers state that the battery can be economically employed to supply currents exceeding 20 milliamps; our tests confirm this statement.

Although the battery has a rated voltage of 66, when tested originally it was actually 90. The initial discharge taken was 20 milliamps, and the discharge continued across the constant resistance for 176 hours' continuous working before the voltage fell below 45. This gives a capacity of 2,640 milliampere hours. Naturally, under normal conditions, when the battery is used intermittently, the hours of service are considerably lengthened. For hard work and high output at high discharge rates the battery can be thoroughly recommended.

## Gilman Floating Cone

THE popularity of the cone speaker using the type of suspension usual in



Gilman Floating Cone

moving-coil speaker practice is demonstrated by the number of units, comprising a light cast frame with the cone mounted ready in position, now being marketed.

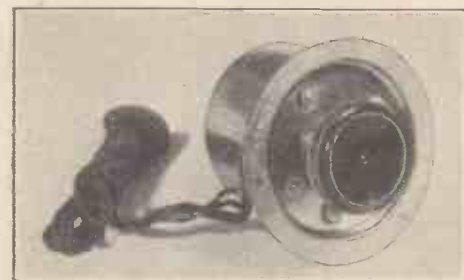
From T. S. Gilman, of 73 Basinghall Street, E.C.2, we have received for inspection a quite good example of this type of unit. It is small—being less than 11 in. in diameter and 3 in. in depth—very light, and is suitable for use with the Blue Spot cone unit. Lugs are provided for mounting on a baffle board.

The cone itself is of a heavy paper and is suspended by a ring of thin rubber which appears to be satisfactory in use.

The price is 13s.

## R.C. Cone Unit

THE construction of a cone loudspeaker may be undertaken with success by the wireless beginner or even by those who are not mechanically minded.



R.C. Cone Unit

Good results can, however, only be obtained with a good unit, a correctly designed cone and a suitable method of mounting it. Of the three the unit is of primary importance.

An interesting and efficient cone unit is marketed by the Ridged Cone Co., Ltd., of 10 Red Lion Passage, W.C.1, and is known as the R.C. unit. It is priced at only 13s. 6d. The external appearance of the unit would suggest that it operates on a simple armature and single magnet principle, since the adjusting knob is provided at the back. When the cover is removed, however, the armature is found to be balanced between two electro-magnets in the approved style. The adjustment merely serves to control the sensitivity, since it is possible to adjust the armature until it is almost touching one pole.

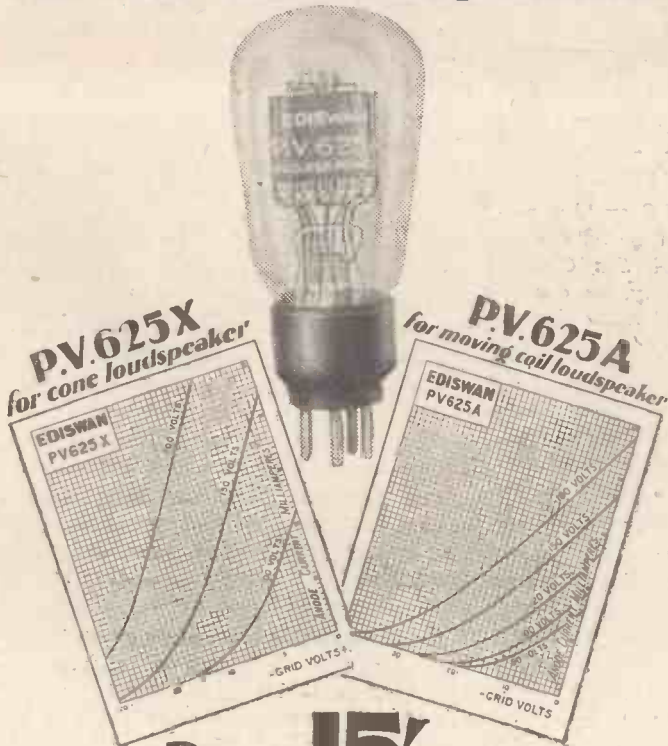
We tested the unit in conjunction with an R.C. cone and obtained quite good results. The sensitivity was up to standard whilst the quality of reproduction was quite pleasing. Having suffered with balanced armature units in the past owing to lack of provision of means for adjustment, we appreciate the control fitted to the R.C. unit.

"A.W." Solves your Wireless Problems



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**A pair of**  
**remarkable**

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Amplification 7 Slope 2.8 ma/v Imped. 2500 ohms	} @ $V_a = 100$ @ $V_g = 0$	Amplification 4 Slope 2.5 ma/v Imped. 1600 ohms	} @ $V_a = 100$ @ $V_g = 0$
Amplification 7 Slope 3.5 ma/v Imped. 2000 ohms		Amplification 4 Slope 3.6 ma/v Imped. 1100 ohms	

Note the characteristics—these valves will handle all the power necessary to drive a large cone or moving-coil loud-speaker at large room strength without any distortion

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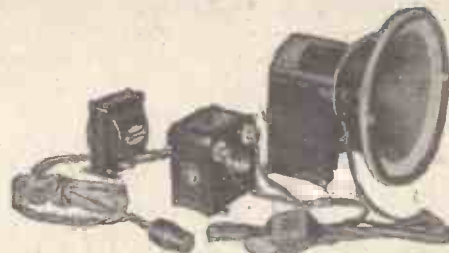
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Ask your dealer for details, or send 1d. stamp with your name and address for a copy of our booklet, "The All-Metal Way."

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# RADIOGRAMS

**L**ISTENERS to 5GB on February 9 will hear a relay from the Queen's Hall, London, of the biennial festival concert of the St. Cecilia Choir, to be conducted by Harvey Grace. The transmission will also be taken by 2LO and 5XX. The orchestra of the Purcell Society, and Girls' Club members, numbering 500 voices, will also contribute to the entertainment.

The programme to be given by the B.B.C. Symphony Orchestra, under Sir Thomas Beecham, on February 8, will be devoted to the works of Delius. Although the performance is to be relayed from the Kingsway Hall, it will not be open to the public; only a specially selected audience will be present.

Another work by Mabel Constanduros, *Heart's Desire*, a musical comedy *en cascade*, will be produced at Belfast on February 14. The cast includes the authoress, Olive Groves, Harold Kimberley, and Leonard Henry, who will interpret the part of William, a hot-cross-bun designer. Mabel Constanduros will revisit Newcastle on February 16 to take part in a variety programme, to which Sterndale Bennett will contribute humorous songs at the piano.

*Micro-Matics* is the title of a review of sketches and compositions from the pen of Ernest Longstaffe, to be broadcast on February 16.

The main item of the 2LO evening programme on February 6 will be Sir George Henschel's light opera, *A Sea Change*. Although he is over seventy, he can be classed among the foremost *lieder* singers.

*Thompson*, an unfinished three-act play by St. John Hankin, will be broadcast on February 6 by all stations of the Manchester group from the Little Theatre, Hull. The play was Hankin's last work, the manuscript, with his notes, being sent by his wife to George Caldron, who completed it for the stage.

From the Manchester station listeners are to hear on February 9, *Behind the News*, a sketch in three episodes by P. Hoole Jackson. It depicts in dramatic form an incident which may lie hidden in a casual news item in a morning newspaper.

Broadcasts on the short waves by KDKA Pittsburgh, Pa., on Christmas night, were received by both the Byrd expedition in the Antarctic and by the steamer *Fort James* at the North Magnetic Pole.

Radio Toulouse has abandoned its bell interval signal and for the present only the call of the station is given.

The last six months saw the number of radio licences in Australia increase by more than 20,000.

Soviet Russia is second only to the U.S.A. in the number of its broadcasting stations. There are sixty-seven stations, but, it is estimated, there are only 250,000 receiving sets in use and an average of only 4,000 listeners for each station.

The Nationalist Government Reconstruction Committee of China has appointed George Shecklen of San Francisco, and A. B. Tyrell of New York as its advisers in connection with the carrying out of a contract with the Radio Corporation of America for the building of a high-power station in Shanghai. The two men are representatives in China of the Radio Corporation.

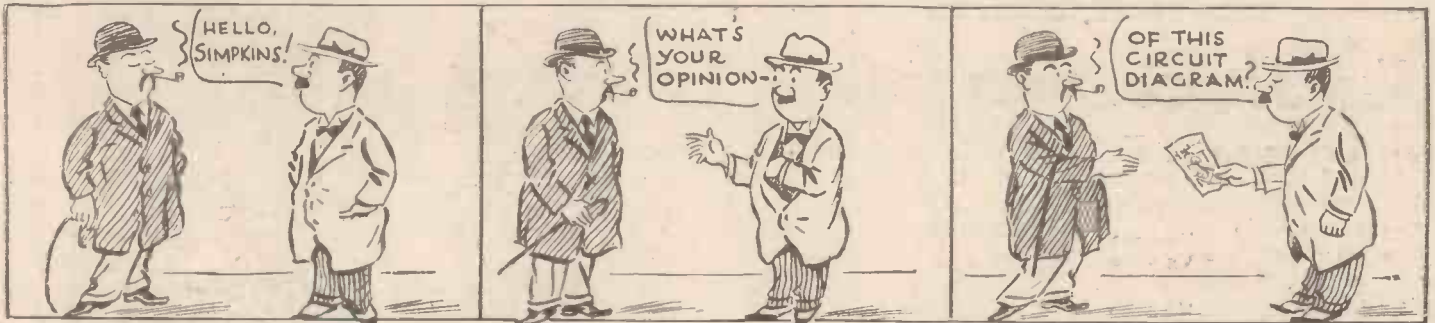
The Madrid Radio España broadcasting station now limits its transmissions to one evening every week, namely, Mondays at 10 p.m. It is to be found on 404 metres.

The Strasbourg private broadcasting station has suspended its transmissions, as the French P.T.T. has now definitely decided to instal a regional station in the city.

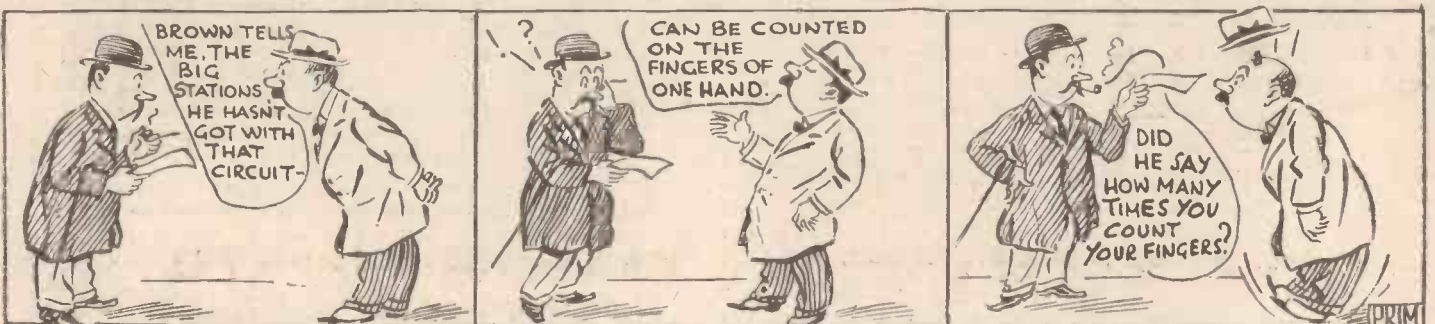
A substitute for the quartz crystal now used for the stabilizing of short-wave transmitters is being investigated, it is reported, by Professor George W. Pierre of Harvard University, Boston, U.S.A.

Herbert Hoover, Jr., son of the President-elect, has accepted the position of radio communication specialist with the Western Air Express Company at Los Angeles.

**MR. FLEX MEETS A FRIEND—**



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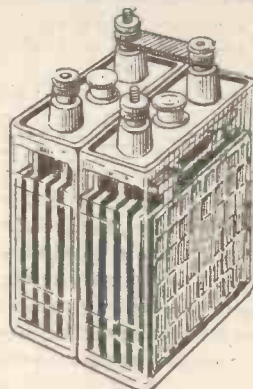
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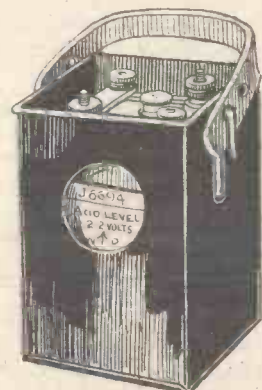
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## LETTERS TO THE EDITOR

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

### Linen-diaphragm Loud-speakers

**S**IR,—I am just writing to say I made a linen-diaphragm loud-speaker some weeks ago, and it surpasses all the others I have made, bought or heard. I made it as instructed, and took great trouble with the "doping" of the linen, using the finest quality obtainable. The unit is the latest 4-pole Hegra. The rod had not to be lengthened (a long rod is a hopeless proposition), and I added a simple mechanism for adjusting the reed under varying conditions.

I think, at present, the linen-diaphragm loud-speaker is the best for tone and "reality." H. R. (Tooting Common).

### Differential Condensers

**S**IR,—In No. 345, the Technical Editor tells us "All about the Differential Condenser." He concentrates his observations on the ease of handling and the stability of the receiver when making use of a differential condenser, but fails to mention what is of perhaps the greatest importance in these days, when every attention is paid to the quality of reproduction, namely that the capacity across the impedance in the anode circuit is always constant: a low-frequency transformer is designed to give a straight-line frequency characteristic with a certain capacity across its primary windings. By making use of a differential condenser, the characteristic remains unaltered on varying the reaction as the net

capacity of this type of condenser is constant.

May I also be allowed to mention that the wavelength at which resonance may occur in an H.F. choke will tend to be increased, due to a certain amount of capacity being always virtually across the H.F. choke. This will assure stability up to the highest wavelengths normally used in broadcast reception. A. P. S. (London, N.W.).

### An Efficient Set

**S**IR,—About this time last year I had the pleasure of informing you of the splendid results I had obtained with the "Modern Tuned Anode Three." I have now replaced this set with the "Near and Far Three-Four," and I feel I should also let you know my results with it, especially on the short waves. The set functions excellently on the medium and long waves, most of the Continental and British stations being brought in at various degrees of strength on the loud-speaker.

This is my first set for short-wave work, and my fears that it might not function on the short-waves efficiently have been dispelled, for in a fortnight I have succeeded in logging KDKA, Pittsburgh, 2FC Sydney, 3LO Melbourne and WGY Schenectady. H. (South Croydon).

### Transmission Quality Deteriorating?

**S**IR,—In addition to the interminable sand boring talks, and the still more boring hours and hours of Chamber Music, the B.B.C. consistently insult listeners by the statement that the standard of transmission is immeasurably superior to the standard of reception.

This is merely a bald statement, but it would be very interesting to your readers, I

think, to have it amplified and explained how, as is the concensus of opinion among my friends, who own fairly good sets and take an interest in them, is it that the standard of transmission is steadily dropping and not only does it drop, but it is extremely variable. J. W. (Upminster).

### "The James Special Three"

**S**IR,—Having constructed the "James Special Three" with additional transformer-coupled L.F. valve, I should like to say I am extremely pleased with this very good all-round set. I laid out the set exactly as indicated, using the beautifully made Wearite coils. With two Ferranti A.F.5 transformers, I find quality all I could wish for—speaker being Blue Spot unit attached to small cone and 3-ft. square baffle.

At the same time may I offer my congratulations on the standard maintained by your periodical week by week.

J. (Camelford).

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following, Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or the Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

## PUBLIC ADDRESS AND THE "ORCHESTRA FOUR"

**O**NE of the great points about the "Orchestra Four," constructional details of which were given two weeks ago, is that it can be used for public-address work, either by itself or in conjunction with radio and gram-radio. This is rendered possible by means of simple push-pull switching which changes over from radio to electric reproduction, and, in the latter case, from pick-up to microphone as desired.

The microphone may be one of the carbon granule Post Office type, in which case it will be necessary to have also a microphone transformer and to place the microphone in circuit with the primary winding and a small dry battery. The secondary winding will then be connected to the sockets on the terminal strip of the set. Alternatively an ordinary telephone ear-piece may be used, and this should be connected directly to the microphone terminals. It will then function in exactly the same way as a pick-up and while not giving such a large output, is a very cheap and convenient arrangement.

Two-, four-, or six-volt valves may be

used, and no valve table is given, because it is felt that most owners of an outfit of this type have their own ideas on valves for large-power work. It should be noted, though, that the first valve, if it is a six-volter, should have an impedance of approximately 30,000 ohms; the second should be an ordinary low-frequency valve, having an impedance of about 8,000 ohms, while it is recommended that in the push-pull stage two super-power valves of very low impedance (about 3,000 ohms) should be used.

It is recommended that about 200 volts H.T. should be applied to the common H.T. tapping, the "juice" coming from ample-capacity H.T. accumulators or a mains eliminator. Grid-bias values will have to be found by trial and this is particularly easy, for the milliammeter serves as a guide to show when the bias on the push-pull valves is correct. A 36-volt bias battery will be needed to give ample adjustment range and the values for the R.C. and push-pull stages will generally be found to be about  $4\frac{1}{2}$  and 25-30 volts respectively.

If the set owner has a pick-up which he knows gives very good results it would perhaps be advisable to test the set in conjunction with a gramophone before using it for radio. The *modus operandi* should be as follows.

Plug in the loud-speaker, thus switching on the valves, adjust the volume control to about two-thirds "soft," set the switches so that the pick-up is in circuit and play over one or two records.

The motor-boat stopper should prevent any signs of L.F. instability and if howling or plopping arises it can generally be traced to incorrect battery values or, of course, to a broken connection or faulty component. Grid-bias voltages will need adjustment, while primary distortion may be checked by means of the sliding arm of the potentiometer on the baseboard.

Finally, the volume control should be varied and a second check made to ensure that the push-pull stage is not overloaded when the first and second valves are working nearly "all out."



**BLUEPRINTS**

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

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- Oceanic Short-wave (D, Trans) .. .. . AW 91
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- Globe DX Two (SG, D) .. .. . AW157
- East to West Short-wave Two (D, Trans.) .. .. . AW159
- "Q"-coil (D, Trans) .. .. . WM62
- Two Daventry Two (D, Trans) .. .. . WM97
- Key-to-the-Ether Two (D, Trans) .. .. . WM107
- Meteor Two (D, Trans) .. .. . WM114

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- "Q"-coil 3 (D, RC, Trans) .. .. . AW 84
- British Station Three (HF, D, Trans) .. .. . AW122
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- All-purpose Short-wave Three (D, RC, Trans) .. .. . AW147
- Screen-grid Q Coil Three (HF, D, Trans) .. .. . AW150
- All-Round Three (D, RC, Trans) .. .. . AW155
- James Special Three (HF, D, Trans) .. .. . AW156
- All-Britain Three (HF, D, Trans) .. .. . AW158
- Bantam Three (D, RC, Trans) .. .. . AW160
- Hartley Dual-range Three (D, RC, Trans) .. .. . AW166
- Everyday (D, 2 Trans) .. .. . WM52
- Pole to Pole Short-waver (D, RC, Trans) .. .. . WM89
- Inceptor Three (SG, D, Pentode—1s. 3d. with copy of "Wireless Magazine") .. .. . WM105
- All-wave Screen-grid Three (HF, D, Trans.) .. .. . WM110
- Gramophone Three (D, 2RC) .. .. . WM115
- Standard Coil Three (HF, D, Trans) .. .. . WM117
- Festival Three (D, 2LF-dual Imp.) .. .. . WM118
- Wide-world Short-waver (SG, D, Trans) .. .. . WM120
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**FOUR-VALVE SETS (1s. 6d. each)**

- Overscas Short-waver (HF, D, 2Trans) .. .. . AW133
- The Ranger (SG, D, RC, Trans) .. .. . AW145
- Facility Four (HF, D, 2RC—Q-Coil) .. .. . AW154
- Broadcast Picture Four (HF, D, 2RC) .. .. . AW163
- Orchestra Four (D, RC, Push-pull) .. .. . AW167
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- Touchstone (HF, D, RC, Trans) .. .. . WM109
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- Economy Screen-grid Four (SG, D, RC, Trans) .. .. . WM113
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**FIVE-VALVE SETS (1s. 6d. each)**

- "Q" Gang-control Five (2HF, D, 2Trans) .. .. . AW161
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- Empire Five (2 SG, D, RC, Trans) .. .. . WM96

**SIX-VALVE SETS (1s. 6d. each)**

- Short-wave Super-6 (Super-het, Trans) .. .. . AW 67
- Connoisseur's Six (2 HF, D, RC, Push-pull) .. .. . WM88
- Eagle Six (3 HF, D, RC, Trans) .. .. . WM106

**AMPLIFIERS (1s. each)**

- One-valve LF Unit .. .. . AW 79
- Screened-grid HF Amplifier .. .. . AW138
- "A.W." Gramophone Amplifier (3RC) .. .. . AW162
- Range Extender (HF Unit) .. .. . WM38
- True-tone (3 valves) (Trans, RC) .. .. . WM47
- Gramo-radio Amplifier (2v) (Trans.) .. .. . WM72

**MISCELLANEOUS (1s. each)**

- H.T. Eliminator for A.C. (200 v. output) .. .. . AW102
- Hook-on Short-waver (Amplifier) .. .. . AW104
- Knife-edge Wavetrap (6d.) .. .. . AW131
- Duplex diaphragm Loud-speaker .. .. . AW142
- L.T. and H.T. Mains Unit (D.C.) .. .. . AW123
- Linen-diaphragm Loud-speaker with Baffle .. .. . AW152
- Pedestal Cone Loud-speaker .. .. . AW164
- A.C. Battery Eliminator .. .. . WM41
- "Junior" Moving-coil Loud-speaker .. .. . WM81
- Universal Short-wave Adaptor .. .. . WM82
- Valveless A.C. Power Unit (L.T.) } 1/- the pair WM100
- Valveless A.C. Power Unit (H.T.) }
- Simple Cone .. .. . WM111
- Buzzer Wavemeter (6d.) .. .. . WM121
- H.T. Unit for A.C. Mains .. .. . WM125
- Lodestone Loud-speaker .. .. . WM126

**PORTABLE SETS**

- Daventry Loud-speaker Portable 5 (2 HF, D, RC, Trans) .. .. . AW107 1/6
- House and Garden (SG, D, RC, Trans.) .. .. . AW116 1/6
- "Best Yet" Portable (SG, D, 2 Trans) .. .. . AW136 1/6
- House Portable (SG, D, RC, Trans) .. .. . AW168 1/6
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T14 PLUGS  
AND SOCKETS**



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CONNECTOR  
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This is a very useful accessory to possess, as it connects easily T14 plugs or Wander plugs. Ideal for joining extension leads to loudspeakers and earphones, saving wall fittings. Price 3d. each.

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**"THE VOICE BEHIND THE SCREEN"**

(Continued from page 164)

static effects and commutator ripple of the projector driving motor. The output from this three-valver is taken to a pair of terminals on a switching panel and thus here we have two sets of "talkie" output, being either from the Vitaphone record or the Movietone film.

Next in the circuit we have what is known to the engineers as a "fader." This is really a potentiometer device which acts as a volume control and facilitates the switching at the finish of one record and the beginning of another. The fader is placed on the wall within easy reach of the operator.

The main amplifier, which follows next, is contained on one "rack." We start off with a three-valve amplifier, similar to that in the body of the projector. The filaments of the valves are lit with D.C. but the H.T. is rectified A.C. Thus when the pick-up is working we have, so far, only three stages of amplification, but six in the case of the Movietone, owing to the amplifier in the projector.

Next on the rack is one stage of push-pull amplification, with an accompanying two-valve rectifier for H.T.; the filaments are directly heated from A.C. The final stage of amplification, from which the loudspeaker output is taken, is also a push-pull  
(Continued on next page)

**Readers are  
REQUESTED**

to peruse

the Test Report  
of

**IPSO BATTERIES**

given on page 1105  
of this journal,  
dated December 22,

**FOR THEIR  
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mahogany



**3/6**

**neat-  
accurate and  
inexpensive**

Watch for Brownie's latest triumph in artistic moulded components — the "Dominion" Vernier Dial. Special non-back-lash slow motion drive gives very accurate turning, while the action will fit any condenser, and the new design of the dial will enhance the appearance of every set.

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**"DOMINION" VERNIER DIAL**

THE BROWNIE WIRELESS Co., (G.B.) LTD.  
MORNINGTON CRESCENT, LONDON, N.W. 1

**He came  
He heard  
He bought**



**47'6**

He came, doubting and grumbling. He heard, first with indifference, then with attention, then with wonder, and finally with enthusiasm; and after that he bought. And he paid, not 5 guineas, but 47/6.

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- 33, WHITELOW RD., CHORLTON-CUM-HARDY, MANCHESTER.

## "THE VOICE BEHIND THE SCREEN"

(Continued from preceding page)

arrangement and gives an output of about 24 watts speech output!

There are one or two other interesting points in the projecting box, which may seem strange to the ordinary grammo-radio enthusiast. One is a speed control for the electric motor which drives both the turntable and the projector. This is a special development of the Western Electric Co., Ltd. (who are responsible for the technical side of the Vitaphone), and embodies a thermionic valve bridge arrangement controlling the current in a special field winding in the motor. If the motor runs too fast the current in this extra field tends to slow it down and *vice versa*. Constant speed is essential in any acceptable "talkie" system, for if the speed varies, the tone of the sound will change.

The output of the last push-pull stage is taken to a positioning and impedance control on the amplifier rack. The reason for this is that with the average Western Electric equipment four loud-speakers are used behind the screen and the volume from these must be controlled so that when a person appears on the screen to be standing up when speaking the sound output from the two top loud-speakers is accentuated. Otherwise the effect would be, particularly to listeners in the front of the cinema, that the voice is coming out of the speaker's feet! This acoustic trick is dealt with by the positioning control, but in altering the loud-speaker volume the total impedance of the whole circuit is changed and this, again, has to be kept in check by the impedance control.

The Amplifier rack for Vitaphone and Movietone Systems. This talking film equipment is now being operated in so many cinemas in London and in the provinces that wireless enthusiasts cannot help being interested in the way in which the various giant grammo-radio problems have been overcome.



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Range 230/2000 metres

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Your MULLARD MASTER 3 or any similar circuit, fit the popular

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Six-pin base mounting, less switch 7/9 each  
Panel mounting with switch 10/6 each

AND IF you cannot afford above, make up the BANTAM THREE, the wonderful THREE-POUND-TEN THREE VALVER for which our M.4 DUAL was specially selected.

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Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
<b>GREAT BRITAIN</b>											
25.6	11,750	Chelmsford (5SW)	20.0	305	982	Agen		275	1,090	Turin (test)	0.5
243.0	1,230	Newcastle (5NO)	1.5	322.0	931	Vitus (Paris)	2.0	333	909	Naples (Napoli)	1.5
200.9	1,150	*Leeds (2LS)	0.2	330.3	892	Le Petit Parisien, Paris	0.5	387	775	Genoa	3.0
273	1,100	*Sheffield (6LF)	0.2	354	846.7	Algiers (PTT)	2.0	443.8	676	Rome (Roma)	3.0
288.5	1,040	*Bournemouth (6BM)	1.5	370	811	Radio LL, Paris	1.0	456	653	Bolzano	0.3
288.5	1,040	*Bradford (2LS)	0.2	382.7	784	Toulouse (Radio)	9.0	504.2	595	Milan	7.0
288.5	1,040	*Edinburgh (2EH)	0.2	414	734	Radio Maroc (Rabat)	2.0	<b>JUGO-SLAVIA</b>			
204.1	1,020	*Dundee (2DE)	0.2	410.0	720	Grenoble (PTF)	1.5	260.9	1,150	Laibach	5.0
204.1	1,020	*Liverpool (6LV)	0.2	449.8	668	Bordeaux (Radio Sud-Ouest)	2.5	308.3	973	Zagreb (Agram)	1.25
204.1	1,020	*Stoke-on-Trent (5ST)	0.2	449.8	668	Paris (Ecole Sup., PTT)	0.7	<b>LATVIA</b>			
204.1	1,020	*Swansea (5SX)	0.2	476	630	Lyons (PTT)	5.0	528.2	563	Riga	2.0
204.1	1,020	*Hull (6KH)	0.2	1,080	277.6	Strasbourg	5.0	<b>LITHUANIA</b>			
303	991	Belfast (2BE)	1.5	1,488.15	202	Eiffel Tower	8.0	2,000	150	Kovno	15.0
311	964	Aberdeen (2BD)	1.5	1,744	172	Radio Paris	8.0	<b>NORWAY</b>			
323	928	Cardiff (5WA)	1.5	14.83	20.230	Nauen (AGAI)	20.0	242	1,240	Rjukan	1.0
358	838	London (2LO)	3.0	37.65	7,968			297	1,010	Notodden	0.7
378	793	Manchester (2ZY)	1.0	41.50	—	Doeberitz (AFK)	5.0	365.9	820	Bergen	1.0
396	757	*Plymouth (5PY)	0.2	67.65	4,434			387	775	Fredrikstad	1.0
401	748	Glasgow (5SC)	1.2	51	5,882	Bergedorf (AFL)	3.0	456	658	Aalesund	1.0
482	622	Daventry Ex. (5GB)	24.0	210	1,370	Flensburg	1.5	456.9	658	Porsgrund	1.0
* Relay stations. † Relays 2LO.											
<b>AUSTRIA</b>											
250	1,200	Linz	0.5	240	1,250	Nurnberg	4.0	496.7	604	Oslo	1.5
277.8	1,080	Salzburg (under construction)	0.5	250	1,200	Kiel	0.7	500	600	Tronsö	1.0
354.2	847	Graz	0.5	250	1,200	Cassel	0.7	566	350	Hamar	0.7
456	658	Klagenfurt	1.5	263.2	1,140	Cologne	4.0	2,041	142	Bergen	6.0
456	658	Innsbruck	0.5	265.5	1,130	Muenster	1.5	<b>POLAND</b>			
519.2	577	Vienna	15.0	272.7	1,100	Kaiserslautern	1.5	245.9	1,120	Posen	1.5
<b>BELGIUM</b>											
220	1,360	Chatelaineau	0.25	272.7	1,100	Danzig	0.75	314	955	Wilno	1.5
275	1,090	Ghent	0.5	280.4	1,070	Koenigsberg	4.0	416.1	721	Kattowitz	10.0
320.7	910	Schaerbeek-Brussels	0.5	283	1,061	Berlin (E)	0.7	566	500	Cracow	1.5
511.0	586	Brussels	10.0	283	1,061	Stettin	0.7	1,415.1	212	Warsaw	10.0
<b>CZECHO-SLOVAKIA</b>											
265	1,130	Kosice	2.4	283	1,061	Magdeburg	0.7	<b>ROUMANIA</b>			
277.8	1,080	Bratislava	0.5	321.2	937	Breslau	4.0	306.3	757	Bucharest	4.0
343.2	874	Prague (Praha)	5.0	326.4	919	Gleitwitz	6.0	<b>RUSSIA</b>			
432.3	694	Brunn (Brno)	2.4	361.9	829	Leipzig	4.0	825	363.5	Moscow (PTT)	25.0
<b>DENMARK</b>											
330.8	883	Copenhagen (Kjbenhavn)	1.5	374.1	802	Stuttgart	4.0	925	323	Homei	2.5
1,153.8	262	Kalundborg	7.5	387.1	776	Dresden	0.75	1,000	300	Leningrad	20.0
<b>ESTHONIA</b>											
408	735	Reval (Tallinn)	2.2	391.6	766	Hamburg	4.0	1,485.1	202	Moscow	30.0
<b>FINLAND</b>											
374	800	Helsingfors (Helsinki)	1.2	421.8	712	Frankfurt	4.0	1,680	378	Kharkov	15.0
1,504	199	Lahti	20.0	455.9	654	Aachen	0.75	<b>SPAIN</b>			
<b>FRANCE</b>											
45	6,666	Agen	0.25	462.2	649	Langenberg	25.0	285	1,050	Barcelona (EAJ13)	2.0
200	1,500	Fécamp	0.3	475.4	631	Berlin	4.0				
211.3	1,420	Beziers	1.0	536.7	559	Munich	4.0	825	970	Oviedo (EAJ19)	0.5
230.8	1,300	Mont de Marsan	0.4	566	530	Augsburg	0.5	309	950	Barcelona (EAJ1)	3.5
230.2	1,270	Montpellier	0.5	577	520	Freiburg	0.7	350.5	856	Seville (EAJ5)	0.5
252.1	1,190	Juan-les-Pins	0.7	1,048.8	182	Zeesen	20.0	400	750	San Sebastian (EAJ8)	0.5
264	1,136	Lille (PTT)	0.8	1,048.8	182	Norddeich	10.0	404	744	Radio España	1.0
273	1,100	Limoges (PTT)	0.5	16.88	—	PHOHI Huizen	50.0	405	740	Salamanca (EAJ22)	5.0
280	1,070	Rennes	1.5	38.8	—	Kootwijk (PCLL)	32.0	426.7	703	Madrid (EAJ7)	3.0
281	1,074	Bordeaux (PTT)	0.5	<b>HOLLAND</b>				<b>SWEDEN</b>			
291.5	1,030	Radio Lyons	1.5	31.1	—	Eindhoven (PCJJ)	25.0	260.1	1,153	Hoerby	10.0
315	951	Marseille (PTT)	0.5	<b>HUNGARY</b>				265	1,130	Trollhattan	0.4
<b>GERMANY</b>											
<b>ICELAND</b>											
<b>IRISH FREE STATE</b>											
<b>ITALY</b>											
<b>JUGO-SLAVIA</b>											
<b>LATVIA</b>											
<b>LITHUANIA</b>											
<b>NORWAY</b>											
<b>POLAND</b>											
<b>ROUMANIA</b>											
<b>RUSSIA</b>											
<b>SPAIN</b>											
<b>SWITZERLAND</b>											
<b>TURKEY</b>											

## CHIEF EVENTS OF THE WEEK

### LONDON AND DAVENTRY (5XX)

- Feb. 4 Bridge broadcast.
- " 6 *A Sea Change*, a comic opera by Sir George Henschel.
- " 7 Annual dinner in commemoration of the birthday of Charles Dickens.
- " 8 Delius.
- " 9 Vaudeville.

### DAVENTRY EXPERIMENTAL (5GB)

- Feb. 3 Military band concert.
- " 6 Vaudeville.
- " 7 Hallé concert from Manchester.
- " 8 Selections from musical comedies.
- " 9 Symphony concert.

### CARDIFF

- Feb. 6 Old-time Welsh entertainment.
- " 8 The Roosters.

### MANCHESTER

- Feb. 3 Special orchestral concert.
- " 5 Concert for the Blind Fund.
- " 7 Hallé concert.
- " 9 Musical-comedy memories.

### NEWCASTLE

- Feb. 9 *The Drum-Major's Daughter*, a comic opera by Offenbach.

### GLASGOW

- Feb. 4 English ballad concert.
- " 7 *Postman's Knock*, by the staff of the G.P.O.
- " 8 Vaudeville.

### BELFAST

- Feb. 4 *The Survivor*, a play by Mabel Constanduros and Michael Hogan.
- " 7 *All Right on the Night*, a musical-comedy extravaganza.





Trace & rectify distortion with a



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**IMPORTANT.**

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Have been specified for THE ORCHESTRA FOUR illustrated on page 100, Jan. 19 issue. Ask your dealer, or send for leaflet free, "What simple meters can show you." SIFAM MILLIAMMETERS. Moving Iron 10/- Moving Coil 25/-

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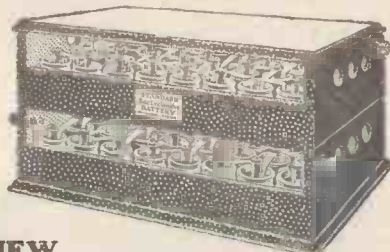
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**PERMANENT H.T. SUPPLY**

During the last year the sales of this wonder permanent battery have been **QUADRUPLED**—providing amazing tribute to its efficiency and reliability. The secret of its success lies in the fact that it is positively **SELF REGENERATIVE** and **RECHARGES ITSELF OVERNIGHT**. It maintains a constant pressure of non-sagging even-flowing current, that wonderfully improves reception. It **LASTS FOR YEARS** and all that is necessary to maintain the voltage is replenishment of the elements at long intervals, beyond which, little or no attention is needed. **SEND FOR FREE BOOK.** Write now for free new booklet giving full details of new prices and complete table showing life of battery, which assists in selection of right battery for your set. Take the first step to permanent H.T. Write now.

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Price includes all coils, Solid Oak Cabinet, Mahogany 2/- extra.

described on page 165 of this issue. Comprising: All wood cut to size, linen, dope, cone-washer, etc., unit extra.

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**RULES.**—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—AMATEUR WIRELESS Information Bureau, 53/61 Fetter Lane, London, E.C.4

**To Reduce Condenser Capacity.**

**Q.**—I have a .0005-microfarad variable condenser and wish to reduce the maximum capacity to a value suitable for the short waves. What capacity fixed condenser should I connect in series with the condenser to do this?—K. P. (Byfleet).

**A.**—A fixed condenser of .0005-microfarad capacity in series with your present variable condenser will make the total capacity in circuit .00025-microfarad. This value will be quite suitable for tuning on the short waves.—L. C.

**Parallel Valves and Quality**

**Q.**—I am working a moving-coil speaker from an amplifier, the output stage of which consists of two super-power valves in parallel. I certainly receive the bass notes now, but it seems to me that these predominate and spoil my general reproduction. Can you account for this trouble?—O. N. (Shecn).

**A.**—It is due to the use of the two super-power valves. The impedance of the last stage is so low that amplification of the very low notes is rather excessive. It would be better to use only a single super-power valve in the last stage or, failing this, two ordinary power valves in parallel.—W. S.

**Testing Batteries.**

**Q.**—What is meant by testing batteries when "on load," and cannot they be tested "off load."?—C. H. (Southend).

quently a reading taken is not a reliable indication of the state of charge of the battery. By testing a battery when on load we mean that the battery should be tested whilst it is in use and when it has been in use for some little time. In this way the real state of the battery can be found.—L. C.

**When Asking Technical Queries**

**PLEASE write briefly and to the point**

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

**A.**—After being disconnected from a circuit for some time a battery picks up some of the voltage it lost during discharge and conse-

**James Special Three**

**Q.**—The "Special Three" receiver described by Mr. James in a recent issue of "Amateur Wireless" appeals to me, but owing to the fact that the old lacquered cabinet I have in which to house the set has no flap lid to its top I wish to arrange the switches for the coils on the front panel. Can you suggest how I might arrange this without detriment to the efficiency of the receiver?—A. S. (Ilford).

**A.**—You are advised to arrange the coils to lie horizontal with the baseboard so that the ends of the coils in which the switches are mounted are nearest to the front panel. A small hole drilled through the panel to take the spindle of the switches will permit change of wavelength without recourse to opening up the top of the cabinet or sliding the set out of the cabinet. Some slight re-spacing of the components mounted on the panel will be necessary.—C. L.



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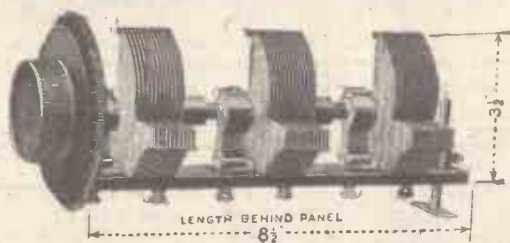
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AMATEUR WIRELESS this issue

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and most EFFICIENT obtainable**



**TWIN**

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Behind Panel 5 1/2 in.  
Weight ... 8 1/2 oz.

**TRIPLE**

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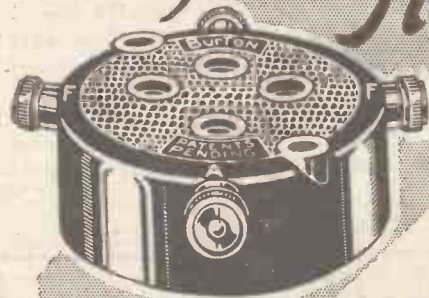
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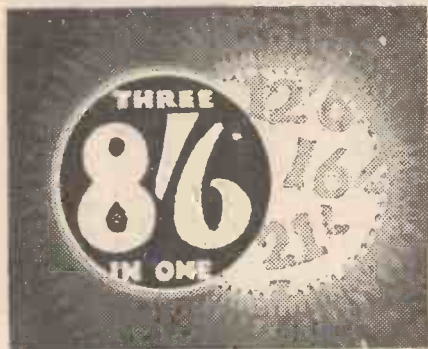


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 0-6 VOLTS  
 0-30 MILLIAMPS  
 Res. 5,000 ohms.

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# THE "HOUSE PORTABLE"

## The Frame Aerial : Test Report

ONE of the most important points about the "House Portable," constructional details of which were given last week, is that it operates from a frame aerial contained in the lid of the cabinet. This makes the receiver portable in every sense of the word, and, combined with the fact that the cabinet is capable of accommodating generous size H.T. and L.T. batteries, or a mains eliminator, renders the whole a transportable.

### Frame Aerial

The frame is quite a simple affair, and can easily be made up by any amateur. Wood of 1/2-in. section is used for the side members and cross members to measurements; constructional details and so on are clearly given on the blueprint which is available for the "House Portable." This can be obtained from the Blueprint Dept. of AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4, price 1s. 6d., post free.

The main side members of the frame measure 15 1/2 in. by 11 in. As the frame is of box formation there are, of course, four of the longer and four of the shorter members. They are nailed together at the corners and the two rectangles thus formed are joined by short cross-members 3 3/4 in. in length. Thus a box-formation frame is formed having the overall measurements: 15 1/2 in. by 12 in. by 3 3/4 in. This will be found to fit neatly into the lid of the cabinet.

Around the frame are wound twenty-one turns of insulated, stranded frame-aerial wire. The beginning and ending of the winding are secured simply by twisting. The centre tapping is made at the same members, around which the ends of the winding are twisted. The insulation is very carefully bared for about half an inch at this point and a short length of similar

stranded wire soldered on.

About 8 in. of wire should be left for this centre tapping, and on the two free ends of the frame. Wander plugs should be attached to the free ends.

All the following stations were received at excellent strength.

(Continued on next page)

"Where did that one come from?"

Type B

Even when their heads are engraved terminals are apt to be very muddling—if the tops come off.

The tops of Belling-Lee terminals cannot possibly come off—one of the many advantages to be gained by using these excellent little products.

Made in Three types. Type "B" 6d. Type "M" 4 1/2d. Type "R" 3d.

Belling-Lee Terminals are specified for the All Europe Three "as they are the best."

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TERMINALS

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By an entirely new scientific method of precision adjustment, we have actually improved the performance of these Units (which have hitherto been regarded, by Press and Public alike, as the acme of perfection). They are now even more suitable for use with the modern Output Valve. Still more VOLUME!! Still greater SENSITIVITY!! Suitable for any type of Cone or Linen Diaphragm Speaker.

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THERE ARE THOUSANDS OF SATISFIED USERS OF THESE UNITS. ARE YOU ONE? If so, write for Illustrated List, describing GOODMAN'S Aluminium CHASSIS AND CONE ASSEMBLY, for use with Baffle Boards, or Cabinets. ANY UNIT on the market can be fitted in two minutes!! REALLY EFFICIENT. INSIST ON GOODMAN'S, and avoid disappointment.

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Station.	Aerial.	H.F.
Brussels ... ..	136	143
Daventry 5GB ... ..	128	134
Langenberg ... ..	121	127
Madrid (Union Radio) ... ..	112	115
Frankfurt ... ..	111	113
Kattowitz ... ..	108	110
Madrid (Radio Espana) ... ..	104	106
Toulouse (Du Midi) ... ..	96	99
London ... ..	88	88
Toulouse (PTT) ... ..	49	54
Paris (Radio LL) ... ..	47	52
Nurnberg ... ..	45	50

**"DO HENRIES VARY?"**

(Continued from page 184)

The great majority of radio users to-day are aware of this saturation effect in the iron, and manufacturers, realising this, are beginning to specify the inductance of their chokes or transformers with various values of direct current through the winding. Even so, there is still an apparent source of difference. Chokes measured with identical polarising current, and appearing to be of identical character, may yet give differing inductances when tested by different methods.

A particular example of this are the American chokes. Judging by the advertisements of the performance of these chokes, the Americans appear to be far ahead of us in the matter of choke design. Tests made on actual American products, however, reveal the fact that this is not the case and that their rating of inductance is, to our mind, optimistic. The difference lies in the fact that we still have a further quantity to specify. We have defined the steady magnetisation of the iron due to the direct current through the choke, but we have not taken any account of the relative magnetising effect of the alternating current. It is quite easy to see that a large value of alternating current may produce quite a different effect on the iron from a small one, and I shall deal with this aspect of the question in a later article. We shall then see that, provided the value of alternating current is also specified, we can then obtain a definite basis for comparison.



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**VARIABLE RESISTANCES FOR VOLUME, TONE, DISTANT CONTROL, ELIMINATORS ETC.,**

As frequently specified by The Experts.  
**• HIGH QUALITY • LOW PRICE •**  
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  - Three 1 mfd. at - 2/6
  - .0002 T.C.C. S/P - 2/4
  - Ferranti A.F.3 - 25/-
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  - .0001 Reaction - 4/-
  - Igranite H.F. Choke - 5/-
  - 3 Sprung V. Holders at 1/3
  - 2 500-ohm Res. at - 3/6
  - 3 Meg. Leak - 2/6
  - 10,000-ohm Res. and Holder - 4/8
  - Output Choke B. 1 - 21/-

**TOTAL £5 : 16 : 1**

FOR 2/6 EXTRA YOU CAN BUY WITH PARTS. Carriage Paid. COILS FOR THE "NEW YEAR THREE" Lewcos 40, 60, 100, 1 each and 2 of 200. Mullard or Six-sixty Valves. 1 S.G. 22/6. 1 Det. 10/6. 1 Pentode 25/-.

**ALL BRITAIN THREE**

Details in my Last Week's Advt. LIST POST FREE

**SPEAKER CABINET**  
 13 x 13 x 6  
**12/11** Carr. 1/-  
**BLUE SPOT**  
**66K 25/-**  
 Or with 12-in. BUCKRAM CONE  
**THE LOT 35/-**

**HARTLEY DUAL RANGE 3**

"A.W." Jan., 12/29  
 .0005 Polar S. Motion 12/6; .0001 J.B. 4/6; All Wave Tuner, Bulgin 15/6; .0002 and 3 meg. 2/-; H.F. Choke 5/6; Lissen 50,000 ohm anode and holder 5/6; Dubilier 2 Mfd. 3/6; Igranite L.F. 14/-; Lissen R.C. Unit 4/-.  
 Accessories with Parts for 3/6 extra.  
 3 A.M. Valve Holders 1 Strip 8x2. Fil. Switch High-grade Panel 14x7 Baseboard 14x9 7 Engraved Terminals Flex 9 B. Clips 30 ft. Connecting Wire Plugs

**BULGIN MULTI TUNER** PUSH-PULL 250/550 1,000/2,250 15/6  
**P.R. VALVES STOCKED**

**WATES' THREE IN ONE RADIO TEST METER** Readings: 0-150 volts, 0-30 milli-amps, 0-6 volts, Res., 5,000 ohms. **8/6**  
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 As specified in this issue. Also for LINEN DIAPHRAGM SPEAKER.

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 If you spend 25/- or more you can buy for 3d. extra any one (only) of the following:  
 S.M. Dial, 100 ft. 7/22 Copper Aerial, 12 yds. Lead-in, Fuse and Holder, 12 Nickel Terminals, 60X Coil, H.F. Choke, Permanent Detector, Battery Switch, .0003 and 2-meg. Leak, 9-volt Grid Bias, Panel Brackets, 6-pin Coil Base, 100 ft. Insulated Aerial, Loud Speaker Silk Cord, 30 ft. Covered Connecting Wire, Ebonite panel, 9x6. 12 yds. Twin Flex, 100 ft. Indoor Aerial, Cycle Rear Reflector.  
 See Advt. in all Wireless Journals.

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 2 .00015 S.M. Condensers, 25/-, 7-ohm Rheostat, 2/6. Clariostat, 500,000 ohms, 8/6. 2 Sprung V.H., 2/6. 3 B.B. Coil Stands, 3/9. .0001 Dubilier and 3 Meg., 5/-. Wearite S.W. Choke, 4/6. L.F. R.L. & Varley, 22/6. Dubilier 2 mfd., 3/6. Set 4 Igranite S.W. Coils, 10/-.  
**Total £4. 7. 9**  
 FOR 1/- EXTRA WITH ABOVE PARTS YOU CAN BUY High-grade 14 by 7 Ebonite Panel (matt. polished, or wavy); Baseboard, 14 by 9; G.B. Clips, Plugs, Flex, Dial Indicators, 7 Engraved Terminals. Post Free U.K.  
 Six-Sixty Valves used in original set, 210H.F., 210L.F. 10/6 each. American Type Cabinet, 13/11 (for 8/11 with above lot). Carriage 1/-.

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**PLUG-IN COILS ACCURATELY WOUND HIGHEST QUALITY D.S.C. WIRE TESTED**

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**A.W., P.W., M.W. STANDARD LOADING COILS, 7/6**  
 C.O.D. extra.  
**MAGNUM, LEWCOS.**

**COPPER SCREENS ALUMINIUM SCREENS**  
 10x12, 10x6, 8x6, in stock.  
 M.W. Screening Boxes, 12/6

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Junit Switch, 9/6; Pair of Cljmax Chokes, 15/-; Permcore Transformer, 25/- each; Pye Differential, 5/6; PM Speaker Unit, 38/-; Pye Valve Holders, 2/- each, etc., etc.  
 Quotation Free for Kit of Parts.

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 Cossor S.G. Valve, 22/8 R.C., 10/6 Power, 12/6 For above Set Carriage extra

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- 2-mfd. Mansbridge Condensers; .0005 S.L.F. Variable Condenser;
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- 12 yds. heavy double rubber Lead in; 5-way Battery Cord for H.T. and L.T.; 10 Engraved Terminals (take plug or spade); State names required.

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Stand extra to either of above, 2/6. All post free.

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**WIRELESS IN PARLIAMENT**



From Our Own Correspondent

ON the day that Parliament resumed after the Christmas recess, the Postmaster-General was questioned as to *The Listener*. Sir Arthur Holbrook inquired whether any protests had been received by the Postmaster-General against the proposal of the B.B.C. to have a weekly newspaper, and whether, in view of the terms of its charter and having regard to the fact that the B.B.C. was State-subsidised and not subject to the payment of income tax, he was going to take any action to veto the proposal.

Sir W. Mitchell-Thomson replied that he had received a protest against the proposed publication from the Association representative of the Press, but the matters in dispute had since been amicably settled in conference between the B.B.C. and the interests affected. He must not be taken as accepting the assumptions in the latter part of the question.

Lieut.-Commander Kenworthy then asked the Prime Minister why he had received a deputation of the interested parties after the Postmaster-General had declined to receive one?

Mr. Baldwin: "In the same way that I always receive a courteous reply to a courteous request."

Lieut.-Commander Kenworthy asked whether it was the practice of the Prime Minister to go over the heads of his trusted Ministers?

Mr. Baldwin said he had never hesitated to do so if he thought it desirable.

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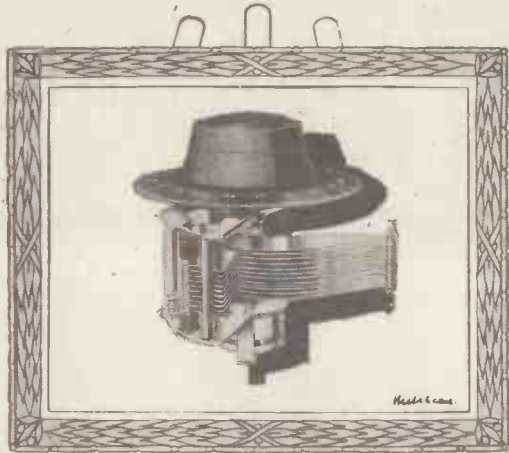
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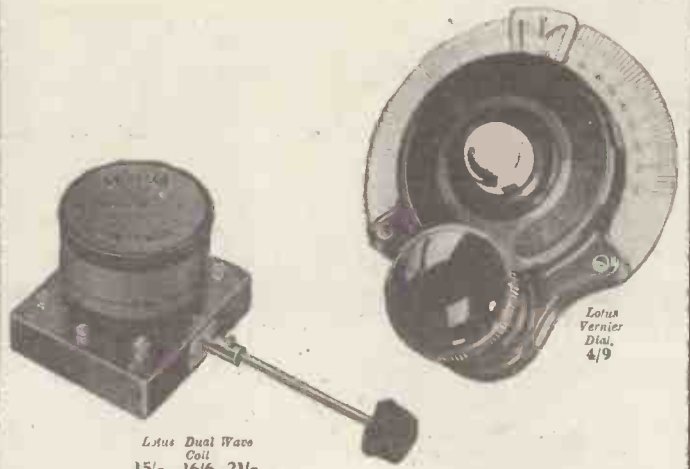
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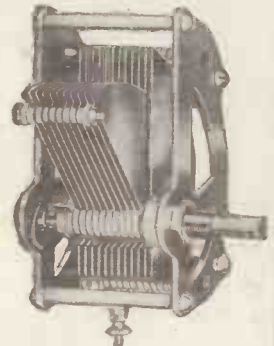


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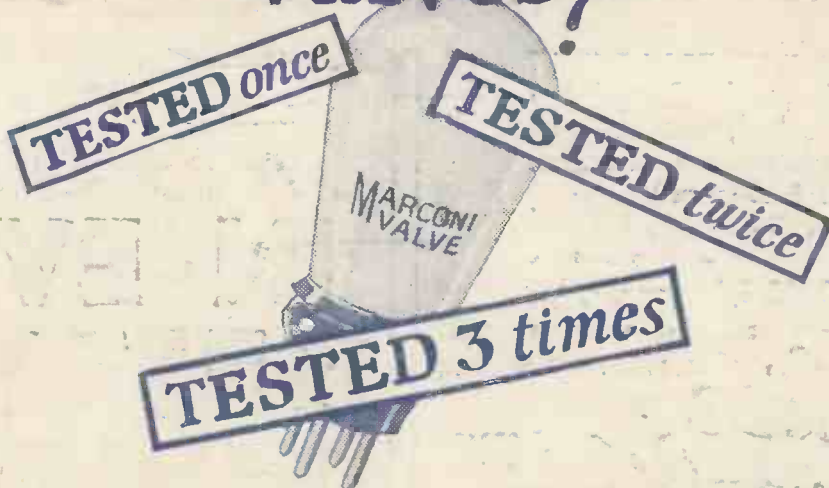
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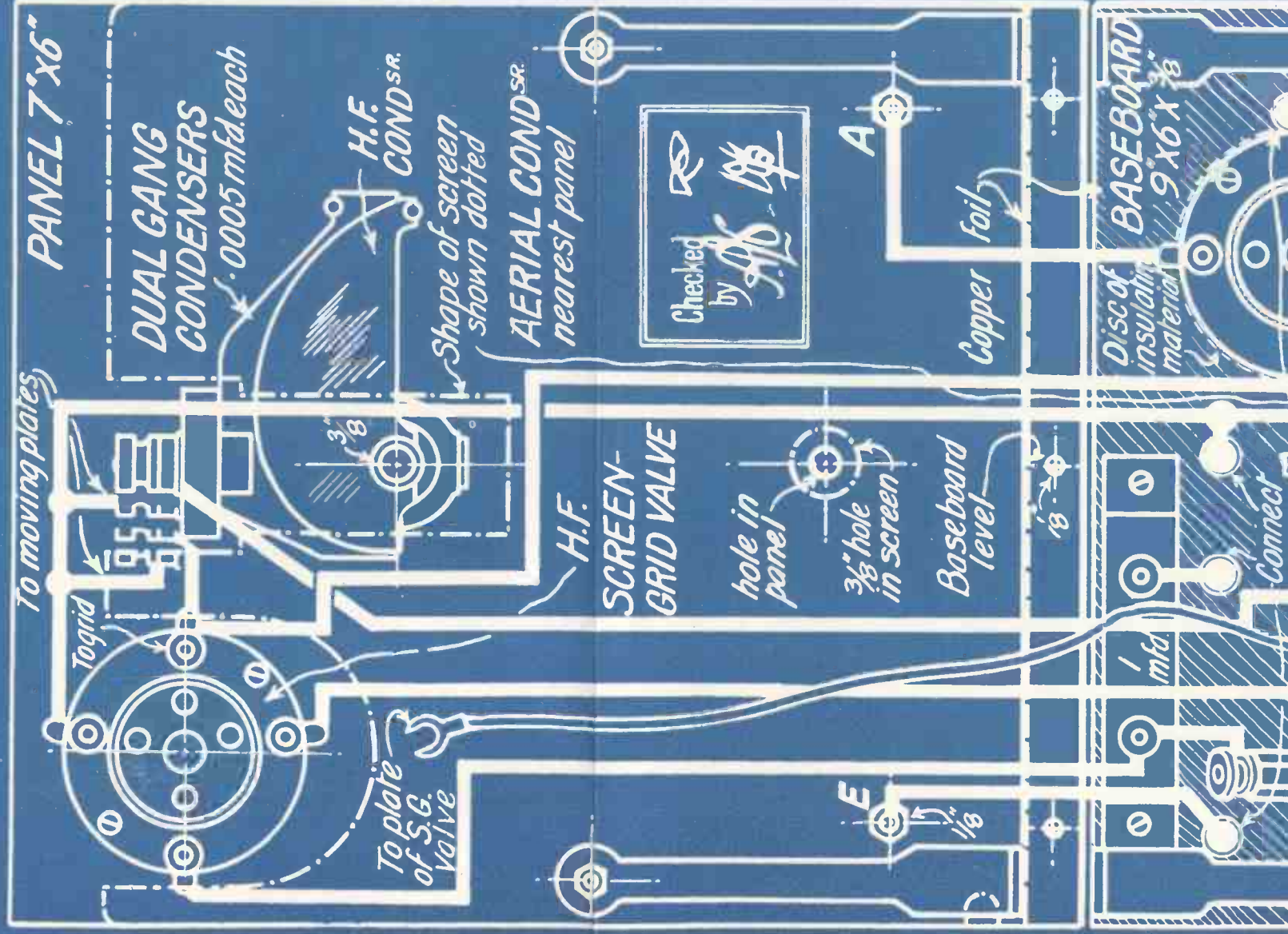
# **BLUEPRINT**

# The LISTENERS' THREE

**BLUEPRINT**  
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Price **1/-**

Full constructional details of this set (including the Coils) and of the Linen-Diaphragm Speaker (see adjoining blueprint) are given in Nos. 347 and 348 of "Amateur Wireless," February 2 and February 9, 1929.



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N°AW170

**18" x 18"**  
**22" x 22"**

**Alternative Loud-speaker units**

**Washers**

**Bush**

**Wood mounting piece**

**Linen diaphragms**

**Meccano strip**

**Screws**

**N°2 BA screwed rod & lengths 2 3/4"**

**Rubber**

**Scale half full size**

**All wood 7/8" x 7/8" section**

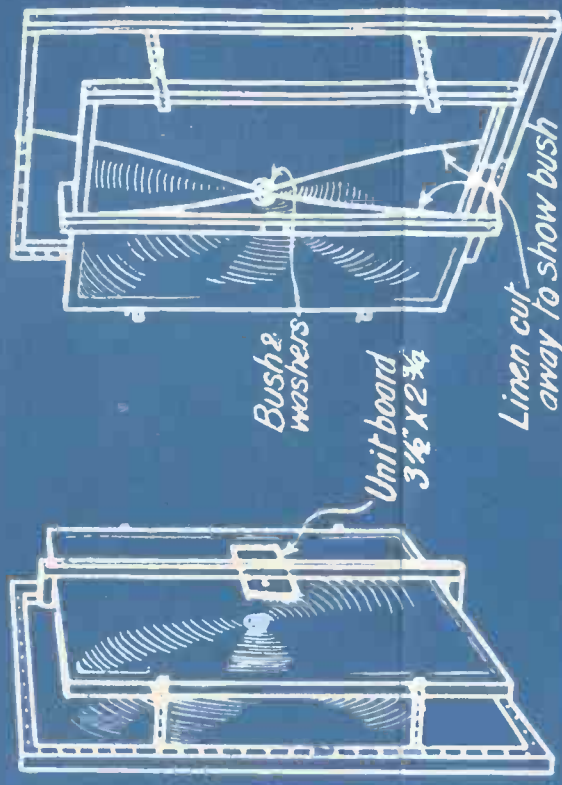
**SECTION Full-size showing the method of securing linen to frame**

**Tacks**

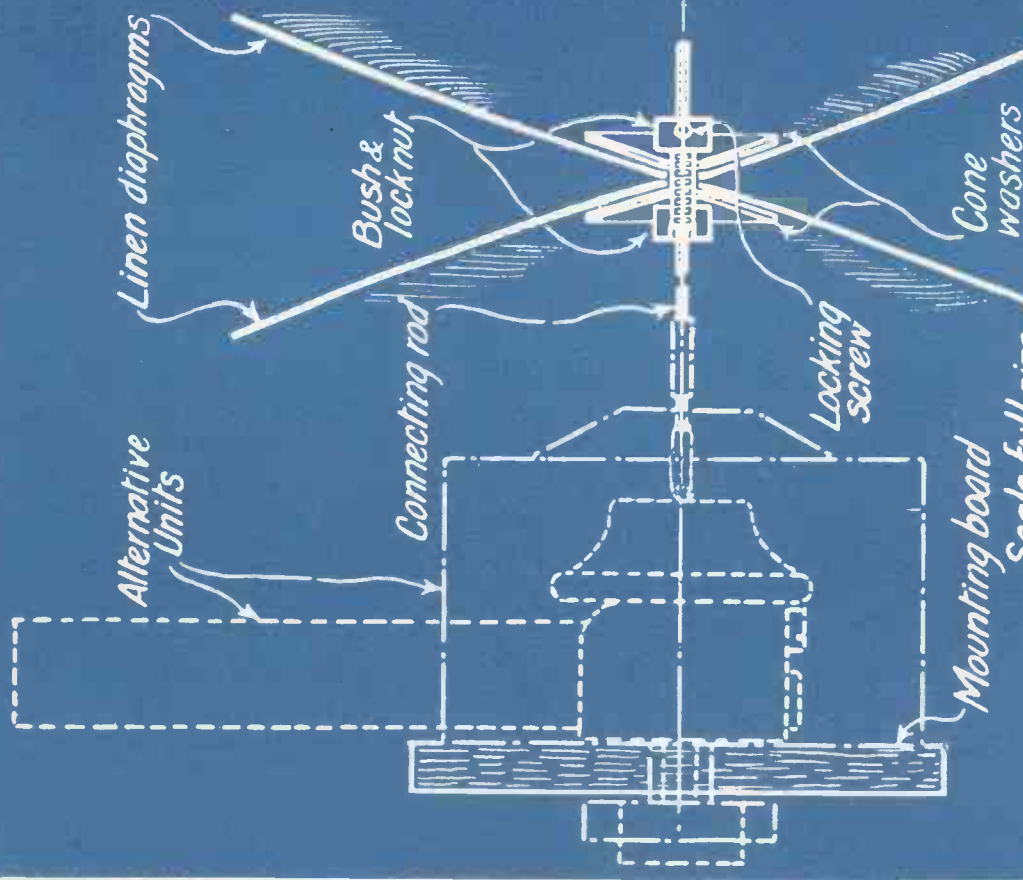
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DUPLIX LINEN - DIAPHRAGM



ADJUSTABLE SUPPORT (4) MEGGANO STRIP



PERSPECTIVE VIEW OF SPEAKER UNIT REMOVED



METHOD OF FIXING DIAPHRAGM Scale full-size

