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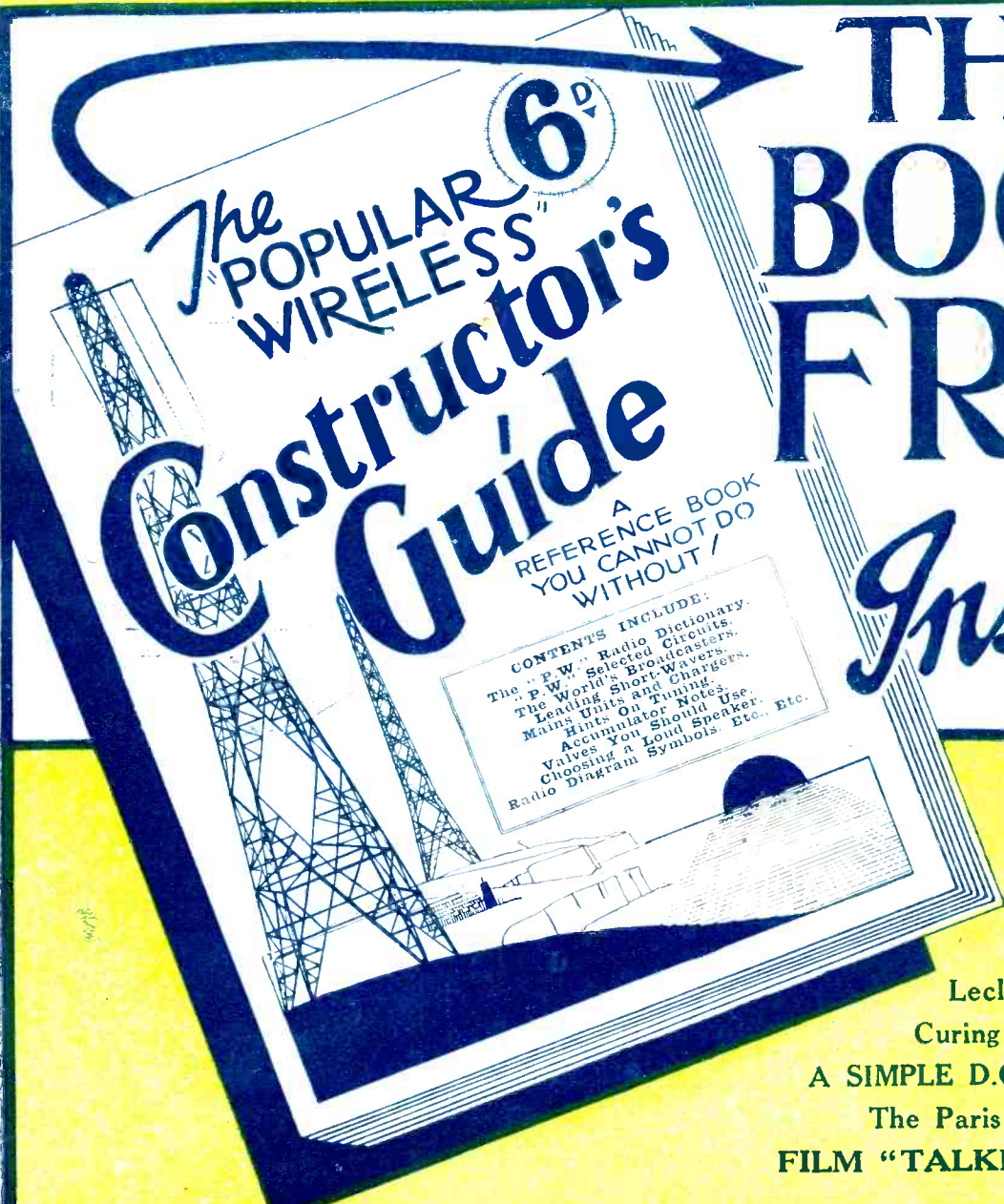
Popular Wireless

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No. 347. Vol. XIV.

INCORPORATING "WIRELESS"

January 26th, 1929.



6^d

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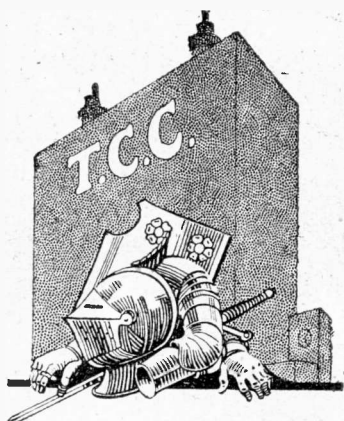
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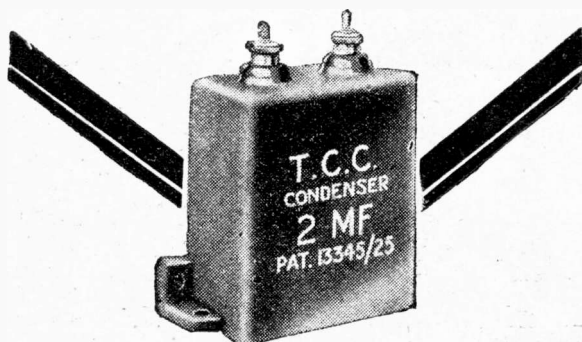
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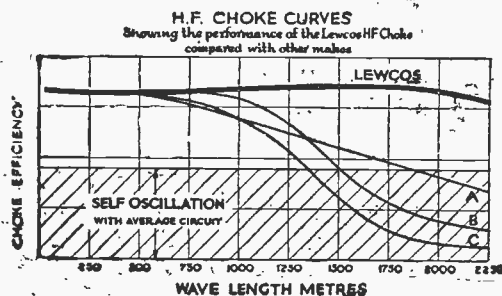
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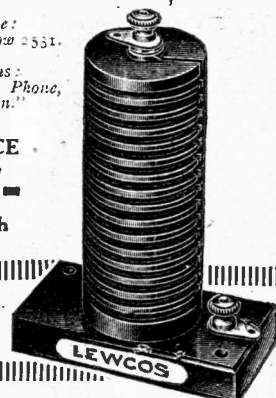
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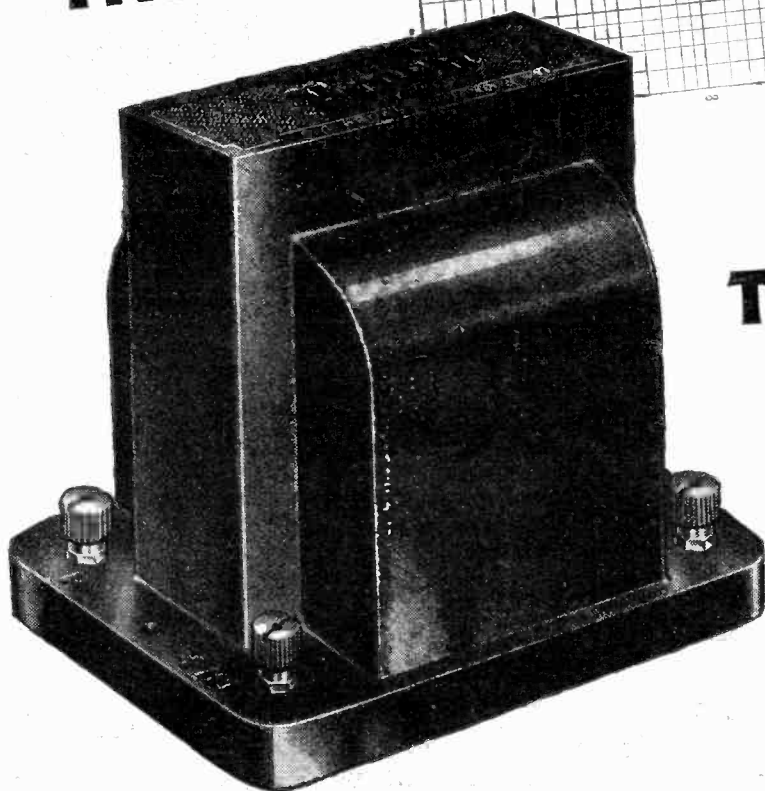
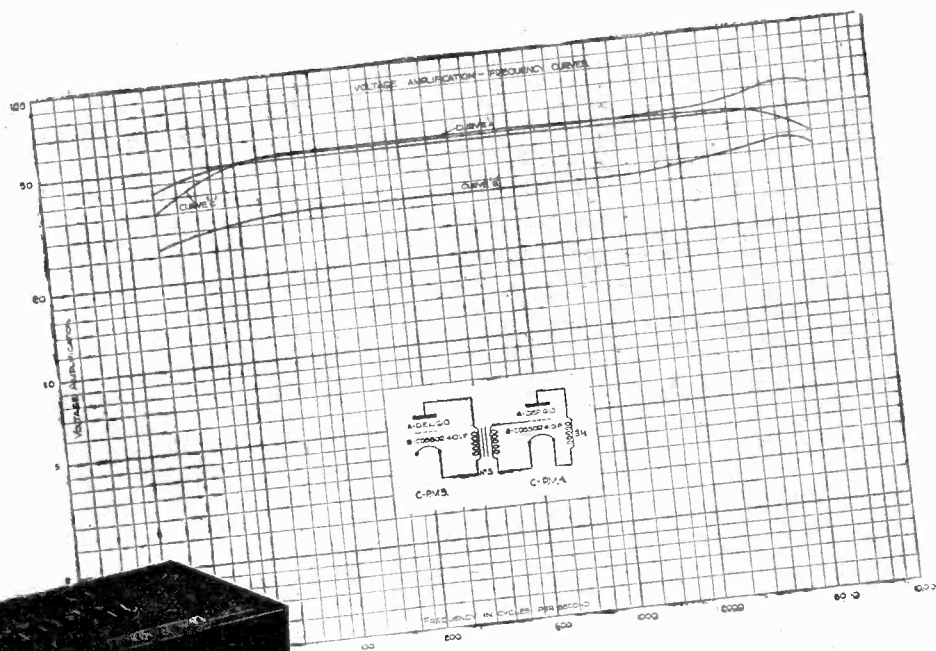
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Extract from article in "Modern Wireless" of December, 1928 — "Further Adventures in Labrador," by Mr. F. Dearlove, Chief Wireless Operator appointed by Sir William Grenfell to link up the Labrador outposts by means of Short-wave Wireless.



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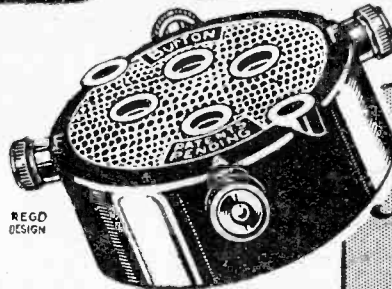
Oldham, Dec. 18th, 1928.
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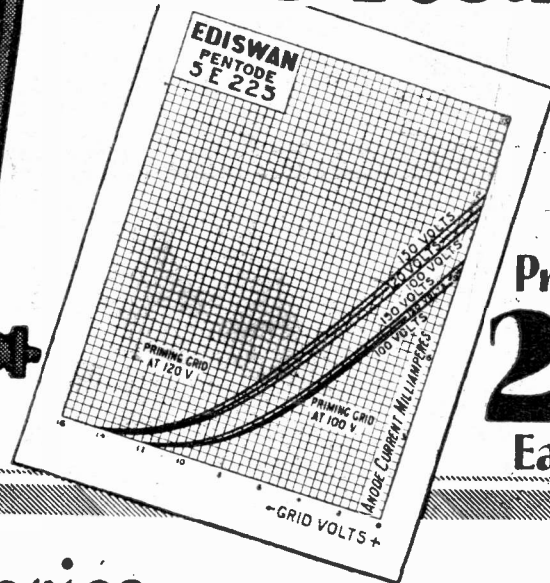
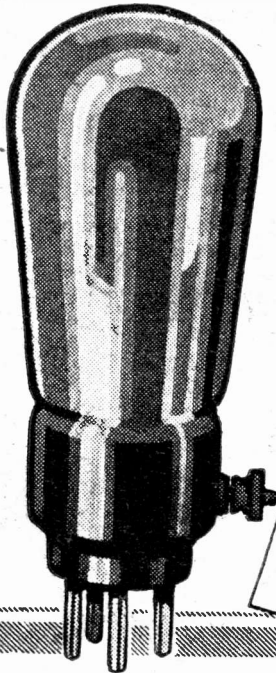
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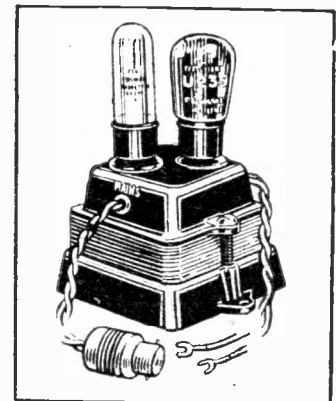
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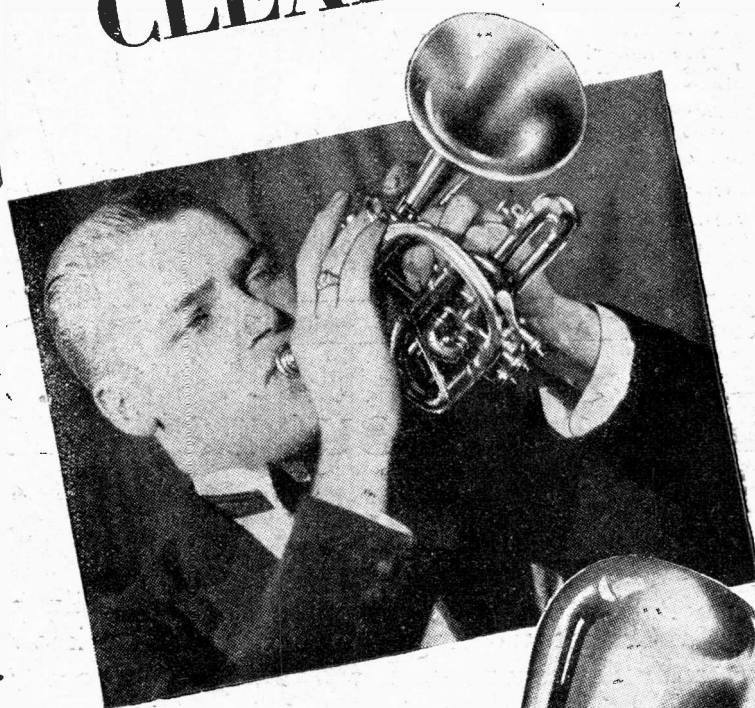
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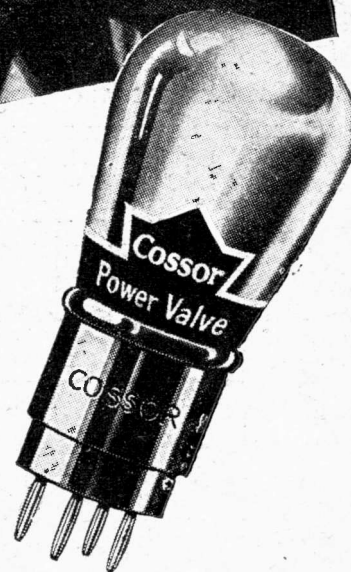


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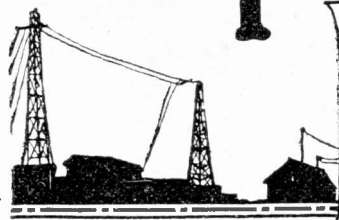


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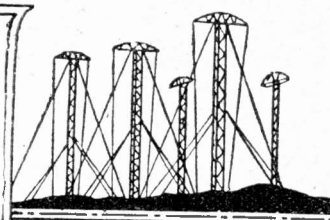
COSSOR VALVES



Popular Wireless



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RADIO NOTES AND NEWS.

Secret of the Beam—A Transmitting "Pirate"—Primitive Wireless—Cupid and the Chink—
Very Portable Sets—Listeners Still Increasing—The Fan of Ajmere.

New Harry Tate in Motoring.

APPARENTLY the folk who go to motoring papers for advice about wireless have to be a credulous breed. Our serene and withered "John Gilpin, Junr." is still conducting his "Little Dot's Corner" in "The Motor," and has recently told his little innocents that he has not seen in the wireless journals a screened-grid circuit which "really got to the bottom of the difficulty." "P.W." did, with the "Pentode" Three; it has also got to the bottom of "John Gilpin, Junr."—not very far to dig, either. He says that an up-to-date set must have a pentode in the last stage "unless it is intended for portable work." Sly dog! As he says he knows what the manufacturers are doing he must know that many commercial portables use pentodes.

Oh, Ethyl!

HE says that the super-Let. is almost universal in the United States. He must have been reading some old first editions, picked out of the "twopenny box," for super-Lets. are almost obsolete in the States. But it is in writing profoundly about the "Magnavox" loud speaker that he cracks his best joke. In reference to some tests another party had made, one of his readers advised that the output transformer should be changed. J Gilpin thereupon gravely replied, "tests were made with a resistance-capacity coupled set in which there was no output transformer to be changed." Of course there wasn't. The darned thing was in the "Magnavox" under an assumed name—but our horsey friend didn't know it. Gee up!

News Bulletin.

IT is reported that M. Citroën, the manufacturer of the well-known motor-car, is intending to launch out into the radio trade with a cheap mass-produced set.

The Union Radiotélégraphique Scientifique Internationale will hold a radio congress at Liège next year.

A high-power station is to be erected in Teheran for the Persian Post Office.

Our own P.O. is to build a station at Fleetwood to serve as an emergency standby for the cables to Ireland and the Isle of Man.

A New Process.

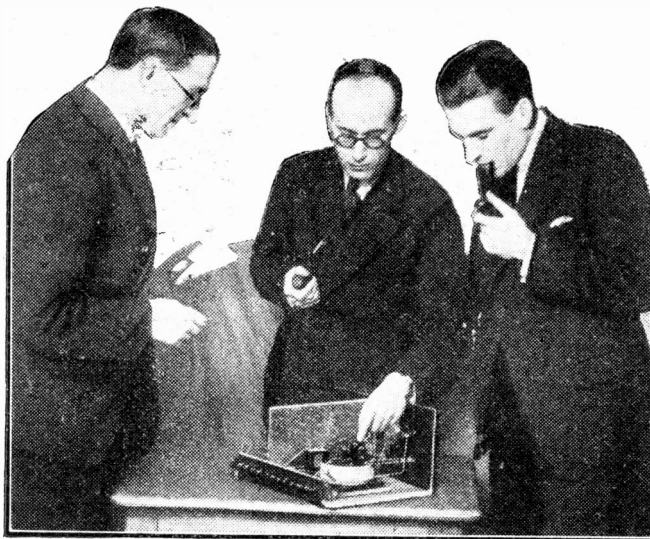
I WAS greatly interested in the announcements made about the new "Einstein" process which enables non-conductors of electricity to be electro-plated. The field of application must be enormously wide, and I should think that a lot of uses could be found for it in the manufacture of radio apparatus. Think, for example, of wire made from plated spider's web, and condenser vanes made of plated rice-paper or butterflies' wings. And what about

Can this be Ter-rue?

I READ a report from Oslo, Norway, to the effect that the police have been called in on the biggest licence-dodging case ever heard of. According to the returns of the authorities, there were some 62,800 licences, of which about 27,000 were not renewed. In addition to this, it is estimated that there are at least 20,000 listeners who never took out a licence. Roughly speaking, about 50 per cent of listeners are now evading payment. The difficulty of rounding them up lies in the fact that they are widely scattered on lonely farms, etc.

Secret of the Beam.

INTERESTING details about how absolute constancy of frequency is secured on the Marconi Beam are just to hand. Vibrations of a tuning fork are maintained electrically, the fork being kept at constant temperature in a heat-insulating box by means of a toluiol regulator which closes a contact when the heat reaches a certain value and, by means of a relay, switches off the heater lamps. When the temperature falls the process reverses. Fans keep the air constantly circulating. From the early Rhumkorff coil transmitter to this super-refinement is a long road indeed.



The Technical Editor of "P.W."—Mr. G. V. Dowding—is here shown (left) discussing with members of the Technical Staff the layout of the "Titan" Three—a great new set to be described next week.

ping-pong balls made of soap bubbles coated with silver?

We Live and Learn.

OUR little helper, whom we call "Lady Jane Grey," because she is apt to lose her head, is by way of being a second Mrs. Malaprop. Whilst prattling in the kitchen recently, she announced that her "boy" had fitted a "two-val" set inside a "taxi-case." She divulged also that the ingenious youth is "a France-corporal in the Aerial Corps."

A Transmitting "Pirate."

MR E. WOODS, 190, Liverpool Road, Ilam, near Manchester, writes to ask "P.W." readers to help him and the authorities to find the unauthorised person who transmits on 45 metres using his call sign G 2 U A. Mr. Woods says that his station has not been in action for six
(Continued on next page.)

NOTES AND NEWS.

(Continued from previous page.)

months, and will not be for some months yet. I hope that anyone hearing Morse sent out by G2UA will try to locate the transmitter. Perhaps some club would D.F. the beggar in the interests of law and order.

Another Transmitting Note.

MR. E. F. BRADLEY, 10, Montenotte Road, London, N.8, should by now be in the middle of some tests he is carrying out on low power on 160 metres every Sunday from January 13th to February 3rd. Transmission will take place for periods of ten minutes at 11.00, 19.00 and 23.00 (G.M.T.), each period being split into five minutes of C.W. and five minutes telephony. Call sign G2AX. Reports are asked for and may be sent to him or to the R.S.G.B., 53, Victoria Street, S.W.1. They will be acknowledged.

Primitive Wireless.

WHILST seeing the film made by the Citroën African Expedition, I was vastly interested in some nigger signalling. The party wished to send a message to its next stopping-place, but as they could themselves travel faster than a native runner, they induced a shiny black gentleman to "radio" their message. This he did by beating on a hollowed tree-trunk with two heavy, short sticks. The strokes were too rapid for me to analyse, but he did not take long, and I am wondering whether the "benighted heathen" has something better than Samuel Morse ever dreamed of. Does any "white" know the code used?

The Mysterious East.

THAT note recalls the yarns which are continually coming from the East, notably India and China, of extraordinary feats of news-transmission achieved by natives. A bit of news started, say, in Bombay, gets all over India in a few hours—in the bazaars. How is it done? Tongue-wagging alone cannot account for it. As to China, I have known cases of news being spread at a speed which apparently can only be explained by pre-supposing that the Chinese have discovered and mastered telephatly.

Cupid and the Chink.

PERMIT me to give an instance of this remarkable broadcasting—or is it "beam"? Years ago in Hong Kong my Chinese "boy" said to me, "Me thinking Misses C— be wife along Mister B— Shanghai-side." On general principles I aimed a kick at his receding rear and told him to confine his observations to matters within his legitimate sphere. I mentioned the incident to Mrs. C—, a charming widow who owned to a married daughter. She said, "Heavens, I'm old enough to be his mother." A few months later I met her in Shanghai, when she told me that B— had proposed to her! Now, my "boy" had never seen or heard of B—, so far as I know. What made him connect the two people? I ask you!

Post Office Interference.

A BRISTOL reader (G. W. N.) calls our attention to the interference caused by the Post Office station at Portishead, which jams 5XX badly. As Algiers heterodynes Cardiff the listeners in the

Bristol area are reduced to 5GB. He took up the matter with the B.B.C., who referred it to the P.O., who suggested that the station should not jam "reasonably selective" receivers. The Chief Engineer of the B.B.C. agreed with the P.O., but apparently both he and the P.O. prefer theory to facts, for the jamming does actually happen, whereas it is hardly likely that none of the complainants has a selective set. I think the matter might well be investigated by the P.O. man at Portishead.

Very Portable Sets.

OBSERVATION of trade papers shows that the criminal world has been testing the portability of portable receivers in a very determined way. The Halcyn Wireless Co. has been robbed of six during the past six months, not to mention fourteen empty cases which the thieves must have imagined to be the haul of their dreams. McMichaels have suffered

SHORT WAVES.

WHERE WILL THAT BROADCASTING STOP?

The B.B.C.'s ambitions are becoming a bit 2 L O-fty.

"Daily Mirror."

Lawyer (on breach of promise case): "But surely you can let me have some of his letters?"

Fair Client: "No; there weren't any. We both had wireless sets."

A correspondent from Cricklewood writes to ask how he can increase his listening distance.

Well, of course, he can get longer telephone cords.

Radio-frequency, writes one of our contemporaries, is a term applied to the appalling number of times a broadcasting station can put over a dud number.

Mrs. Phanne: "What lovely music! I've a mind to send that station an applause card."

Mr. Phanne (wearily): "Yeah! Send a card to all six of 'em!"

"Radio News."

Judge: "What is your name?"

Prisoner: "Sparks, sir."

Judge: "Your occupation?"

Prisoner: "Electrician, sir."

Judge (to policeman): "And what is he charged with?"

Policeman: "Battery, your worship."

Judge: "Seven days in a dry cell!"

"London does not always have everything its own way; sometimes it is glad to welcome Liverpool effort—in radio as in other things." (Liverpool paper.)

Type-setting, for one!

"Punch."

"Re the transformer in my set," writes a correspondent. "When I put my finger on one of the terminals the set works twice as loudly. When I take it off the volume drops again. Can you tell me what to do?"

Good gracious, the man must be simple! Put your finger on again, of course!

and so have Wallace Heaton. The remedy is to line the cases with lead an inch thick and call the things "unportable portables."

Naughty Lancashire.

DURING the proceedings which culminated in the infliction of a £5 fine plus £5 5s. costs upon a Bolton man for operating a wireless transmitter without a licence, the prosecutor alleged that there were more unauthorised transmitting stations in South Lancashire than in all the rest of England. Shocking! But, oh, my

friends, what red-hot enthusiasts! Let them mend their ways, pay up, and show the world what English transmitters can do. I am amused to note that it took the Post Office only two years to locate the evil-doer. Experts, what?

Listeners Still Increasing.

DESPITE the fact that nearly every person one questions complains of the B.B.C. programmes there was an increase in November, 1928, of 34,706 licences. That is really wonderful considering that the B.B.C. is six years' old, and is the soundest criticism of broad-casting one could have. But there are still diehards. I know one who insists on his gramophone, which I heard during Christmas. It cost him £40—and it needle scraped beautifully. There is nasality in most of the gramophone reproductions I have ever heard, which keep them streets behind the best radio.

Down with Loud Speakers.

THIS is the slogan of H. C. (Forest Hill) who puts in a plea for "those who are really lovers of music and nature, and therefore are horrified at the hearing of the distorted and unnatural rendering of loud speakers." In short, he evidently has never heard what a good L.S. can do when properly fed by a good receiver, and he wants the technical mob to produce a set with two or three H.F. stages and no L.F. at all, for use with 'phones. I hope he won't get it because 'phones are so bad for the ears, producing "flat ear," corns, and earache, besides tethering a fellow like a dog to a kennel.

The Expert.

ONE of my neighbours has conceived a great contempt for wireless experts. She tells me that just before Christmas her receiver was struck dumb and that therefore she called in the nearest ironmonger, who gives out that he is a wireless expert. After putting his spectacles well down on the tip of his nose and staring at the inside of the set he uttered these words: "Well, marm, one thing's certain, and that is, something ain't done it no good." Couldn't do better myself.

The "Fan" of Ajmere.

NOT a play by the author of "Hassan." I refer to Mr. S. S. B., who writes an excellent letter from Ajmere, Rajputana. Somewhat flowery in expression, nevertheless our far-off friend writes like a true enthusiast. "P.W." he says, "was the first ray of sunshine delivered to me by post," and, "since then I always look forward with a lover's impatience for the next number." I don't think we were ever praised so sweetly before. The office-boy is still blushing!

Patents and Trade.

GEE & COMPANY, of Chancery Lane, the well-known patent agents, tell me that 1928 was a record for the number of patents applied for, namely, 38,593, the previous record being in 1920, when 36,672 applications were made. Gee's say that patent activity is often regarded as an index of the state of trade; on that basis, therefore, we may consider that things are "looking up." Anyhow, it shows that brains are still working well, despite jazz and the cocktail habit. **ARIEL.**

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FILM "TALKIES" BY RADIO



In this exclusive article the inventor of the new Home Talkies and Picture Scheme has something to say regarding the practical application of the idea.
By G. V. DOWDING, Grad.I.E.E.

ALTHOUGH my invention has other applications, as I have already hinted in a previous article, it is with the rather spectacular Fireside Talkie with which I am going to deal in some detail in this article.

This is how I visualise the scheme operating in practice. At the present moment there are at least two plays per week from every station—and many have proved quite popular. One of these plays could be framed up as a Radio-Cinema production, so that once a week from every station one Radio-Film Play could be transmitted.

Each play could be announced two weeks before its broadcasting, so that those listeners having home-projectors could obtain the necessary film or films.

Listeners not having projectors would listen to the play in the usual way if they wanted to, and their only intimation that it was a Radio-Cinema drama would be that the announcer would give the reel number for the guidance of all those concerned.

If you had a projector you would switch this and its control gear on, and then sit back to look at the pictorial drama and be thrilled by the voices and sound effects keeping in perfect synchronism with it. You would not be asked to make adjustments while the performance was taking place.

Doesn't Upset Programmes.

Thus, you see, those fortunate enough to have the film apparatus would have their Fireside Talkie, while those who were restricted to ordinary radio receivers would still have the play to listen to in the usual way. There would be no sacrifice of programme time in favour of what would, at first, at any rate, be a minority. Later more and more people might have projectors, but we have in these new things always to look at the "blackest" side.

Small provincial cinemas, country town concert halls, mission halls, schools, etc., should very soon help to swell the above-mentioned minority, for ordinary talkies are beyond their resources, while mine would be very much within their reach.

A one-reel drama would last between fifteen and twenty minutes and this, I think, would prove an ample length for

at least the first few broadcasts. Later on, if popular demand warranted it, there could be a few two, three or even four-reelers now and then. I can assure you that the same apparatus could as easily handle a twelve-reel lasting four or so hours. But let us hope the B.B.C. will not be too ambitious!

The operation of a home cinema-projector is a remarkably simple business. You just put on the reel and switch the current on. The rest is purely automatic. And the films themselves are non-inflammable—there is no danger of fire.

The Financial Aspect.

The B.B.C. could handle the whole scheme themselves, including the sale of apparatus, but this would probably prove an unpopular method. It would be better for a reputable group of manufacturers to do this.

The cost of taking the film should not prove excessive—the money spent in this way would be in proportion with the sale of apparatus and the revenue from film hiring. The more popular the entertainment the more elaborate the film. The two would march in parallel.

The B.B.C. would merely have to instal some very simple apparatus and use this when the play was broadcast. Their



A piece of "Talking" film. It embodies both sounds and pictures in the form of photographic impressions. The sounds are recorded in the way lines to be seen on the left.

expenses would be negligibly increased, while their programme interest would at least to some extent increase.

Now the cost of the apparatus involved I have already indicated (in my first article); it may be less if there is a considerable demand for it.

At the present time it costs about 3s. to hire a fifteen to twenty-minute film to

the somewhat restricted circle of home-cinema enthusiasts. When the Radio-Cinema plan augments this circle, there should be little difficulty in bringing the figure down.

And when America starts her Fireside Talkies, in the big way that only such a country can tackle a new thing, an exchange of films, with a consequent increase in the number of hirings, should bring the price down still further. A shilling per time is the figure I would aim at, and if it could be brought down to pence so much the considerably better!

But there is another possible source of revenue, or, at least, possible source of very cheap "talking" films, and that is in the direction of the big commercial "talkies." The ordinary talking film is rapidly gaining popularity, and there are several possible links between these and the wireless varieties.

One of the big corporations concerned might be prepared to pay and pay heavily to broadcast selected excerpts from its special films. There might easily be great competition to do this, with proportionately great revenue for the radio-talkie.

A Ghastly Thought!

Reverting to the film for the home-cinema some of you may wonder how enough copies could be produced economically in order to cope with the demand of all those needing the same film the same night. Perhaps you may wonder if the scheme calls for constant repetition of the same play. A ghastly thought!

Fortunately, no such blot darkens our prospects, all the above figures and details are based on the normal production of radio plays. And if you never have a projector you should never notice the difference of programme arrangements the scheme will necessitate.

As a matter of fact, the Radio-Cinema calls for no special effort on the part of the B.B.C., does not cut into programme-time, does not affect in any way anybody not interested in the business, and surely is one of the soundest things financially one could hope to find.

In view of this no one can object to the B.B.C. trying out the scheme, and they
(Continued on next page.)

FILM "TALKIES" BY RADIO.

(Continued from previous page.)

themselves can have no objection against so doing. If they don't want the slight trouble of adapting some of their dramas to the new conditions, the organisation running the show could build their films around existing dramas, although naturally it would be better to have closer co-operation between the two than that.

Should the B.B.C. not want to take even that slight amount of trouble, then specially prepared talkie-films could be run through at the broadcasting station. And the words and other "effects" could be as good as ordinary broadcasting. Don't

country. But by adding still-picture reception and other things at but little extra cost, then I can foresee the majority of present valve-set listeners being radio-cinema-picture, etc., users.

All the above entertainments at a cost no greater and perhaps a little less than the present price of just a still-picture instrument is my ambition, and as far as I can see there is no reason why it should not be done.

By the way, telephone-receiver addicts can enjoy the fireside-talkie. You can work it just as well in conjunction with 'phones as with a loud speaker.

"Shooting" a Film.

Before I conclude this article I would like to make brief mention of the film we are preparing, entitled "A Dash for Liberty," which has been specially planned and written for the Radio-Cinema.

"A DASH FOR LIBERTY."



Mr. G. V. Dowding, second from left, watching the "shooting" of a "close-up" which occurs in "A Dash for Liberty," an amateur-acted play written especially for the Radio-Cinema.

anticipate results no better than those achieved by some of the ordinary "talkies"!

But the B.B.C. can hardly object to the trying out of the scheme—to give it a few months' run; especially in view of the fact that everything connected with it is so straightforward and inexpensive, and that its applications are wider than any ordinary broadcasting scheme.

If the scheme really "caught on" in this country as well as in others, it should eventually prove possible to loan listeners two or three films each per week at a yearly fee of but a guinea or two. But that is looking at the very bright side of the thing.

The Other Attractions.

Personally, I am of the opinion that it will take a little more than the inducements of even a perfect home "talkie" to make the scheme as a whole sufficiently attractive to be of universal interest in this

country. But I should like to make it clear that the B.B.C. has had nothing whatever to do with this film.

It is being taken purely for experimental purposes—to prove that a play can be presented both by radio and by the film, and in each case prove good entertainment and yet combine equally well to make a really first-class "talkie."

Previously we had been testing with existing film stories and with short "shots" of special characters; "A Dash For Liberty" was the first drama produced with the requirements of the new Radio-Cinema technique well in mind by the author, producer, artistes, etc. Nevertheless, the production is entirely in the hands of amateurs, and it goes without saying that it will only give a rough indication of the scheme's great possibilities.

Plans are already laid down for the building of more professional productions

with the assistance of experts in the various branches of the art concerned.

Reverting to "A Dash for Liberty," perhaps readers will find a few details of this of interest.

The "shots" taken up to the time of writing were acted at Stanmore, Middlesex. This is a rather bleak, deserted piece of country, but ideal for the story.

An Exciting Chase.

The scenes photographed showed a convict escaping from prison and meeting his fiancée, who was standing by in a deserted lane with a fast car.

Prison warders appear on the scene, but just too late to stop the car. They hold up another car and request the driver to chase the runaway. Then follows exciting scenes on the road, the two powerful cars tearing along at top speed.

Just as they are about to overhaul the convict and his fiancée, the warders' car breaks down. Then follows roadside telephoning, police-station and other "shots." Barricades are built in the road to stop the fugitives, but such obstacles are overcome. And so the "run-away" scenes continue.

But all this occupies barely a quarter of the film and is really but the introduction or prologue to a very exciting film which lends itself admirably to breathless incident, animated conversation, and striking scenes and other effects.

Dependent on the Weather.

The pieces where there are slight blanks in the "talkie" thread will be filled by a commentator, so that even without the pictures the drama will be intensely absorbing. You can imagine a play of something of the character of that successful broadcast drama "Speed," which could be supplemented with pictures—in the case of those having projectors.

So far the weather has been kind to us, but if it "lets us down" we are going to be badly held up. You see the whole of the scenes of the drama are to be played in the open, and it is difficult to get our amateur actors together just at the right time.

Later, when studios become available, this difficulty will vanish and the whole thing become very much easier.

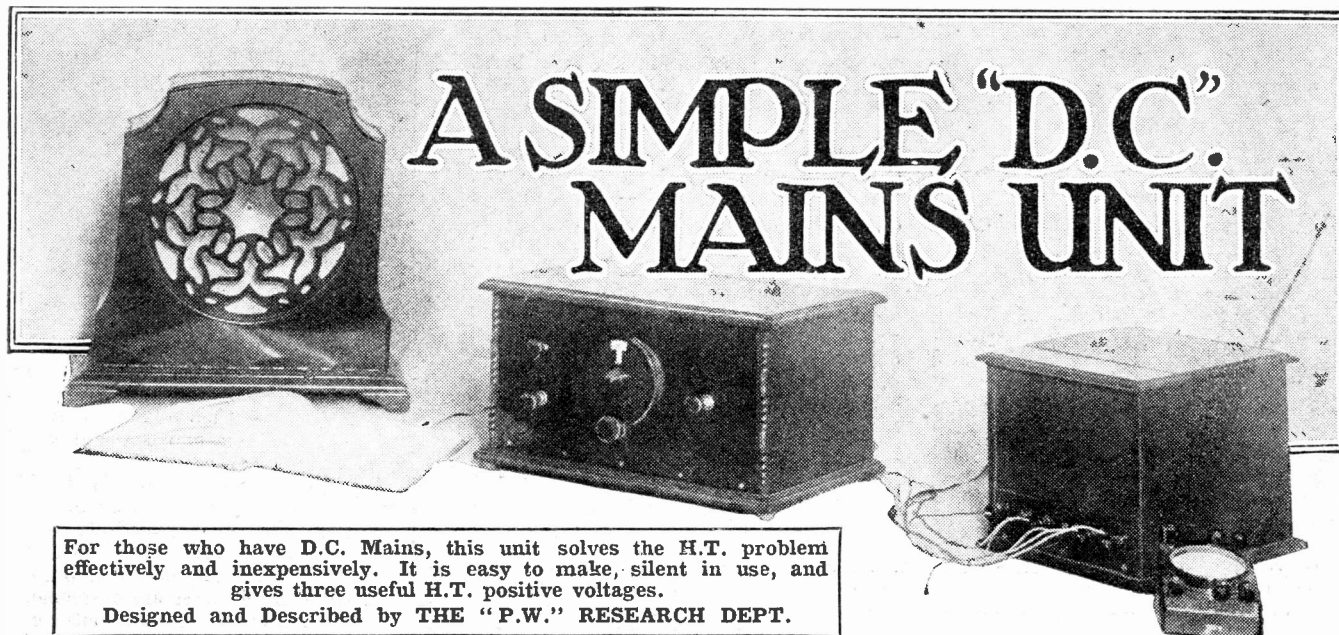
CURRENT SUPPLY ITEMS.

If an accumulator is stood aside for a time it should be given a really good charge every eight weeks or so to keep it in good condition.

Most electric-light supply companies expect the consumer to notify them when making any alteration to the wiring, such as when fitting a charging board for accumulators, etc.

If one of the plugs from an accumulator is lost do not block up the hole with a cork or a wooden stopper, but drill a small hole in this, or otherwise the gases formed inside the cell will have no opportunity to escape.

Usually the little alterations to the wiring of a house necessary for fitting up a charging board or other similar scheme are very easily carried out by an electrician, and can therefore be done cheaply by skilled workmen, thus avoiding danger in the installing and consequent use.



For those who have D.C. Mains, this unit solves the H.T. problem effectively and inexpensively. It is easy to make, silent in use, and gives three useful H.T. positive voltages.

Designed and Described by THE "P.W." RESEARCH DEPT.

"DO it now" may be an aggravating sort of motto to have pinned over your desk in the American fashion, but there is one part of the wireless user's affairs to which it can be applied and forms very sound advice indeed. It is just this: If you have electric light in your house you

of chokes and condensers, and it does not seem justifiable to do this in a design intended for the general use of our readers.

Instead, we have provided enough smoothing to give a reasonable degree of silence on ordinary mains, and you will find that in such cases you will hardly hear any hum at all, and that only in the intervals of the programme. On good mains, of course, you may expect to hear no hum whatever unless you listen on 'phones with a large set.

This, we think, is sufficient for a general design, since if we put in enough smoothing for the very bad mains met with here and there, it would simply mean a much more expensive unit than the majority of people would need. Instead, we will give some suggestions later for increasing the thoroughness of the smoothing for the benefit of the few constructors who may find it necessary to do so.

The general features of the unit make it suitable for use with even quite large sets, and you can take considerable currents from it without the slightest risk of overloading anything or causing bad hum to start. It gives you three separate positive tapplings, each of which can be adjusted in steps from quite a low voltage up to something only a little below that of the mains.

Hence, you can provide separate taps for your H.F., Detector, and L.F. valves, which is so desirable for the prevention of motor-boating and other forms of howling due to coupling between stages.

Across each of these three positive terminals is an extra 2-mfd. condenser, and these serve two important purposes. First, they provide a little extra smooth-

ing, and so help to reduce hum, and, secondly, they act as by-passes, and so prevent any serious coupling effects in the eliminator if more than one valve is run off each tap. For example, it is usually quite safe to run the H.F. valve (if any) from one tap, the detector from another, and two L.F. stages from the third.

Good Choice of Voltages.

Just occasionally you may come across a set which motor-boats under these conditions, but it is very rare, and usually means that the receiver itself is a little unstable, or else it is one giving unusually high magnification, and so very easily sent into L.F. oscillation. The remedy in either case is usually quite simple, and we will give it towards the end of this article.

The three positive tapplings we have been talking about are the terminals on the front strip marked H.T. + 1, H.T. + 2, and H.T. + 3. If you look at the wiring you will see that running from the wiring on each of these terminals there is a flex lead which has an ordinary battery plug-

(Continued on next page.)

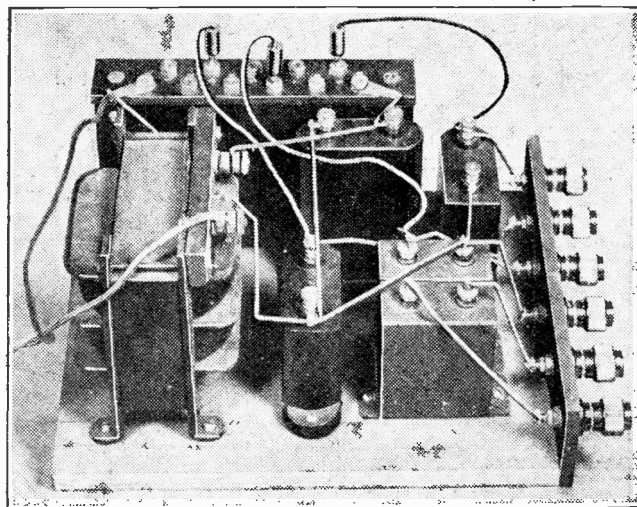
COMPONENTS.

- 1 Cabinet to take panel 7 in. \times 7 in., and baseboard 9 in. deep (Lock, Camco, Raymond, Bond, Gilbert, Pickett, Peto-Scott, Caxton, Artercraft, etc.).
- 1 Ebonite terminal strip, 7 in. \times 2 in. \times $\frac{1}{4}$ in., and piece of wood 7 in. \times 5 in. \times $\frac{1}{4}$ in., or alternatively, a complete ebonite panel 7 in. \times 7 in. \times $\frac{1}{4}$ in. (see text). (Any good branded material.)
- 6 Completely insulated terminals, suitably engraved (see diagram). (Belling & Lee.)
- 1 Heavy-duty smoothing choke (British General, R.I. Varley 28/14, etc.).
- 1 Potential divider (Igranite).
- 5 2-mfd. Mansbridge-type condensers (T.C.C., Dubilier, Lissen, Ferranti, Mullard, Hydra, etc.). (Note: These must be rated at a working voltage of at least 250.)
- 3 Battery-type plugs, wire, flex, screws, adaptor plug, etc.

will certainly get the H.T. for your set from the mains sooner or later, so why postpone the change-over beyond the life of your present batteries?

Simple and Inexpensive.

We have produced the H.T. unit you see in the photos specially to serve the purpose of anyone who may be considering the change to mains supply. We have tried to make it as simple as it can be, yet large enough to be really useful, and at the same time not too expensive. Cost in a D.C. unit, of course, is largely a matter of the amount of "smoothing" it incorporates. To make certain of an absolutely silent background on even the worst and noisiest of mains means using a decidedly expensive number



Construction of the unit is really only a matter of mounting the components, as shown, and wiring up!

A SIMPLE "D.C." MAINS UNIT.

(Continued from previous page)

on its end, and it is by means of these plugs that the voltages can be adjusted. They fit in the sockets along the top of a component inside called a potential divider. This is really just a resistance, with a connection to each end and a number of tapings, the total resistance of the particular make used here being 15,000 ohms.

The two ends of this resistance are connected to the positive and negative sides of the smoothing circuit, i.e. it is put right across the mains so that a constant steady current flows through it. (Quite a small one, because the resistance is so high.) This means that there must be a constant fall of voltage all the way along the resistance, and so by plugging in at a suitable point we can get the adjustment we want.

Voltage Controls.

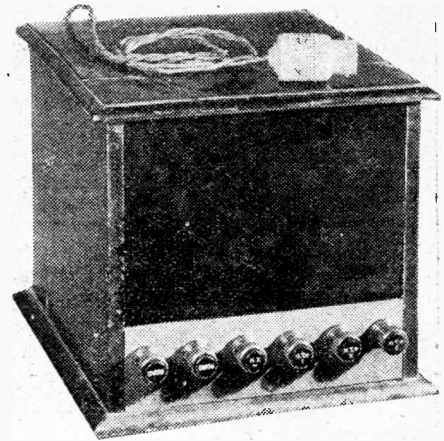
This adjustment of voltage is in steps, of course, but it is quite gradual enough for the vast majority of sets; ordinary valves are not critical as to H.T. nowadays. There are only two cases where a finer adjustment

is sometimes needed, one being for the detector in a short-wave set, and the other the screening electrode in a screened-grid valve.

An H.T. unit with a continuously variable voltage tap is sometimes helpful in these cases, and it is very easy to modify the present one to include it. You will find instructions a little farther on for incorporating an anti-motor-boating resistance, and what you do is this: Instead of a fixed resistance wire fit a continuously variable one in exactly the same way, and then by turning the knob of this control you will be able to get a perfect variation of voltage on this particular terminal. A suitable resistance, by the way, is one with a maximum of perhaps 100,000 or 250,000 ohms (higher still will do), and examples are the "Bradleyohm" (Rothermel) and "Clarostat" (Holzman, Claude Lyons, etc.).

An Extra Tapping.

This extra adjustment is all that you can ever need for short-wave work (many short-wavers will work quite well with just the plain tapping scheme you see in the photos), but for the average screened-grid set you may wonder just how all the valves can be supplied with only three positive terminals. Well, in most cases the following arrangement is quite satisfactory. Run the detector off one of the step-by-step controlled terminals, the H.F. and L.F. valves together off another, and the



Only a terminal strip is required for the "panel," the remainder of the space being filled with a suitable piece of wood.

screening electrode of the S.G. valve off the continuously variable tap.

The only case in which this is not satisfactory is where your last valve is of the super-power type requiring a higher voltage than is desirable for the H.F. stage. Here you really want four separate H.T. positive terminals, and this again is very simply done. Just add another terminal, provide it with a 2-mfd. condenser and tapping lead connected exactly like the others, and the modification is complete.

We are going into these questions of modifications of the design to suit various special purposes rather fully, because we wish to impress upon the reader the fact that to get real satisfaction from mains working is largely a matter of seeing that the unit is really well suited to his own particular requirements.

A Universal Design.

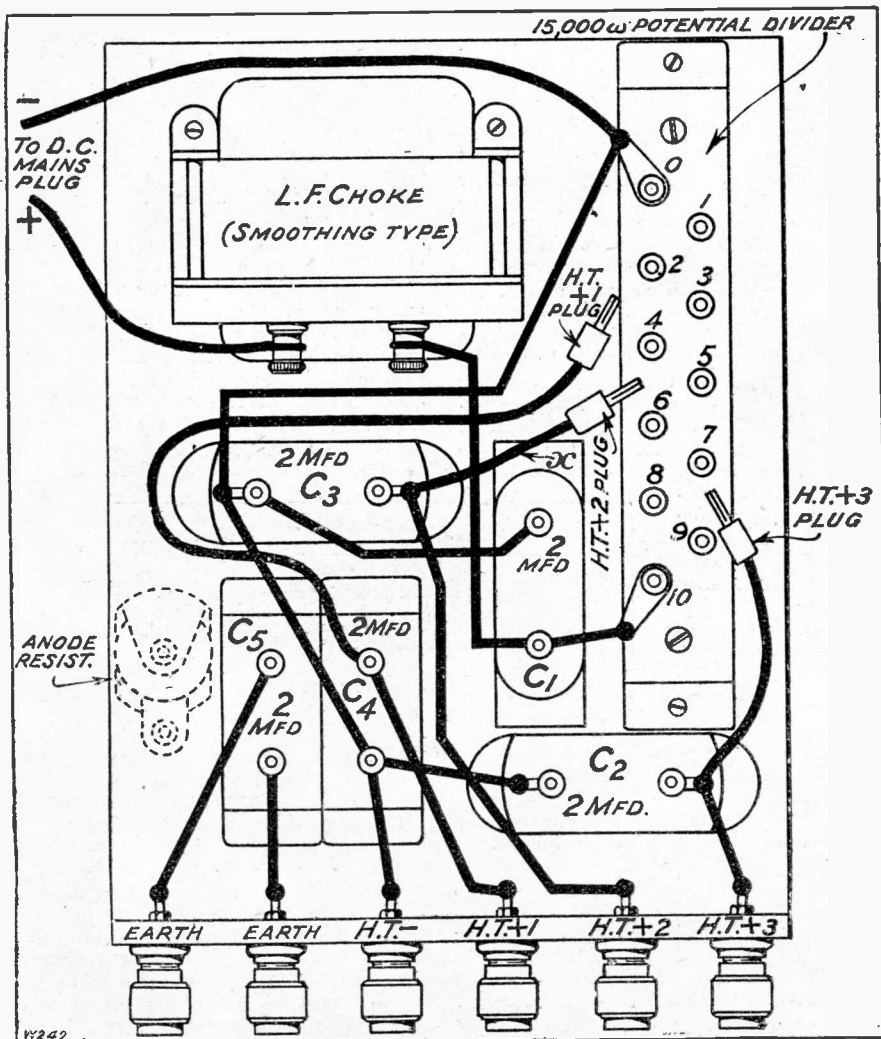
The design exactly as it stands will suit the great majority of users, but we are describing exactly how to make these various little alterations in order that it may be regarded as something of a standard design. Then, if any reader finds his requirements are not quite covered by the simple version, he can just make the appropriate modification without having to search further for a design exactly like the one he wants.

The smoothing arrangements are comparatively simple, but quite effective on most mains. They consist of a large heavy-duty choke, and a main smoothing condenser of 2 mfd. This is the one which you will see is wired on one side to the No. 10 socket on the potential divider, and we shall be referring to this again in a moment. The other condensers, it will be remembered, also act as additional smoothers, so that the total capacity available for levelling out the hum is 8 mfd.

This arrangement is good enough for ordinary mains, but where the supply is a bad one something more may be needed, and we will detail this for the benefit of the few readers who may need it. The first step is to increase the main smoothing condenser to 4 mfd. and this is easily done by connecting another 2-mfd. unit in parallel with the one shown. There is plenty of room for another.

If this does not do the trick the next step is to add another choke, and the simplest way to do this is to put it in series with the

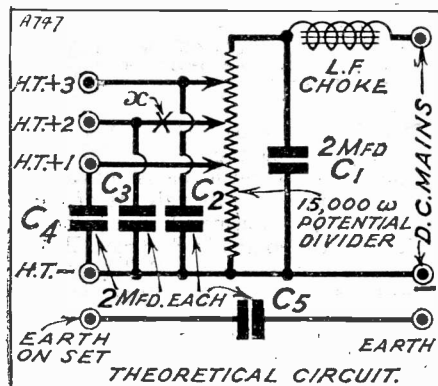
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A SIMPLE "D.C." MAINS UNIT.

(Continued from previous page.)

lead to the tapping intended for the detector valve. This is a particularly good position for three reasons: (1) Since it only has to carry a small current here it can be a small and inexpensive choke; (2) if a choke is provided here it replaces the anti-motor-boating resistance we shall be dealing with



later; (3) so long as you ensure a smooth and clean supply to the detector valve you will hear little hum, as a rule, since this is by far the most critical part of the set.

To insert this extra choke is simple. Just compress the layout a bit (we made it very open on purpose) and you will find that the same size of baseboard will do. Connect the choke in circuit exactly as the anti-motor-boating resistance would be wired, and that is all.

Now about the anti-motor-boating resistance to which we have referred several times. The point is this: some sets are more critical and less stable than others, and may tend to go into a howl, make popping noises, give squawky reaction control, or otherwise misbehave when run from a plain and simple type of H.T. unit. To stop this it is usually quite sufficient to put an anti-motor-boating resistance in the lead to the tapping for the detector valve (H.T.+2).

Anti Motor-Boating.

This is to be placed inside the unit, and can quite well be an ordinary wire-wound anode resistance, or one of the special resistances sold for the purpose (an example is the Ferranti). A suitable value is about 100,000 ohms, and a dotted outline on the wiring diagram indicates a good position for it. To connect it in circuit, note that one of the flex tapping leads is marked x. Cut this and take the two ends so formed to the terminals of the resistance. That's all.

There, those are all the modifications of the standard design which we shall be considering. Don't be alarmed by the number of them, or the apparently complicated nature of the business, for it is really simple enough when you come to put all this into practice. Nine times out of ten the standard unit will serve your purpose exactly as it stands, and you can just disregard all this long story about modifications. We have only included it because we

wanted to make the design as generally useful as possible.

So far as the constructional work is concerned there is very little to be said, because it is such a straightforward job of screwing down components and wiring them up. Just one or two special points would perhaps be the better for a word of explanation, however. First, note carefully how the mains are connected to the unit. No terminals are provided, and instead, the ends of a twin-flex lead (good grade lighting type) are connected directly to suitable points on the wiring. The other end of this flex, of course, carries a plug or adaptor for plugging into a mains point.

The Unit to Use.

You will see that the unit fits into an ordinary type of cabinet, but since the front merely carries a few terminals there is no need to use a full-sized ebonite panel. We used a simple ebonite terminal strip and filled the rest of the front with a piece of wood cut to fit and stained to match the rest of the cabinet. If you like, of course, you can make the work easier by using a complete ebonite panel instead of this composite arrangement. (It will be desirable to do so where you desire to fit the variable resistance mentioned as one of the possible modifications.)

Just one more hint: For the wiring it is strongly recommended that a fairly stiff gauge of wire be used, with Systoflex sleeving. This combination is advised in the interests of safety. Bare wire, especially of a thin gauge, is rather risky, and makes short circuits a possibility.

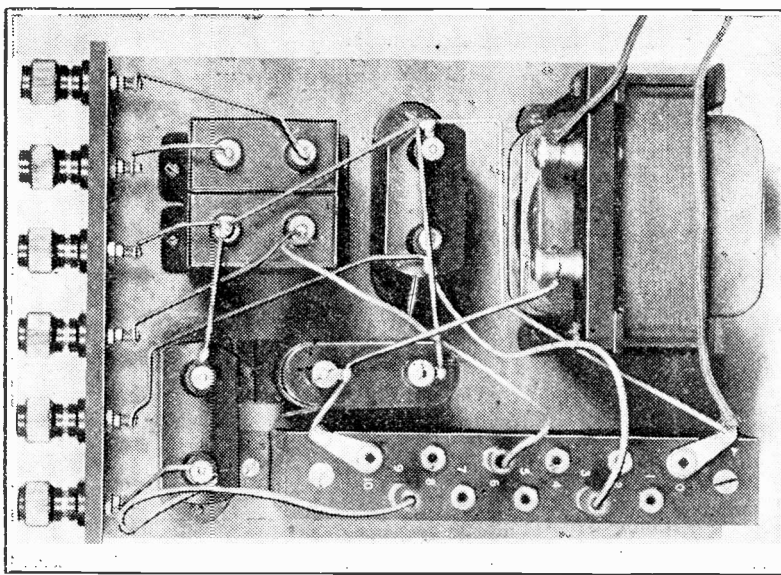
potential to earth, and must on no account be touched when the H.T. is switched on. This even applies to the L.T. accumulator, which should be placed in a box or cabinet to make sure it is not touched.

"If you have electric light in your house you will certainly get your H.T. from the mains sooner or later. Why postpone the change-over?"

Always, therefore, switch off the H.T. and take the plug right out of the mains point before you do anything whatever inside either the set or the H.T. unit. Further, to make sure that all the various reservoir condensers have been emptied, always switch off the H.T. first and the L.T. last. Also, if you then want to do anything inside the set, just take a piece of wire, and join together for a moment the two earth terminals on the H.T. unit.

Beware of Metal Panels.

Be careful, too, not to touch any metal parts on the panel, such as grub screws in knobs, L.T. switch shanks, etc., while the set is working. Sets with metal panels, of course, are definitely too dangerous to use with a D.C. mains unit (safe with the A.C. type), unless the internal wiring is completely separated from the panel, all con-



Note the plugs on the potential divider, which provide the variable H.T. positive potentials.

Finally, a few hints about the use of the finished unit. First of all, note carefully the two earth terminals on the unit. To one of these connect the earth terminal of your set, and to the other your earth lead. This has the effect of placing in series in the earth lead one of the 2-mfd. condensers, a very essential safety precaution indeed, which must on no account be forgotten.

At this point you must be reminded of the risk of shocks from the internal wiring of the set when a D.C. eliminator is working. Remember that practically every single wire in the set may be at considerable

denser spindles insulated where they pass through the metal, and so on.

One last point: The unit must, of course, be connected to the mains the right way round. In other words, if at first you get no results, just take the plug or adaptor out of its socket, turn it round and replace, so reversing the connections.

This is a much easier way of finding the correct polarity than the usual scheme with a glass of water, and is just as certain. Once the correct direction is found, of course, you can mark the adaptor for future reference.

A FULL SIZE BLUE PRINT FREE OF The "TITAN" THREE

The Finest Three Valver ever designed, full details of which will be given for the first time in next week's issue of "Popular Wireless."

This receiver, the outcome of many months of research work, completely renders obsolescent all other sets of a similar kind. It is an entirely new design and employs a screened-grid H.F. valve, with arrangements for using either an ordinary valve or a Pentode valve in the L.F. stage.

Amongst the special advantages of the "Titan" Three are:—

A really remarkable wave-change system has been evolved by the technical experts of "Popular Wireless," and by means of a very simple switch the set can be made immediately available, without coil changing, for reception of long or short waves.

A novel method of coupling enables one tuning circuit to be dispensed with, so that one-knob tuning is achieved without any sacrifice of sensitivity and without the introduction of any complicated system of condenser ganging.

For all its wonderful technical efficiency, the "Titan" Three is one of the cheapest and easiest-to-build three-valve sets ever placed before the home constructor, and in performance it is easily equal to a five-valve set of last year's design.

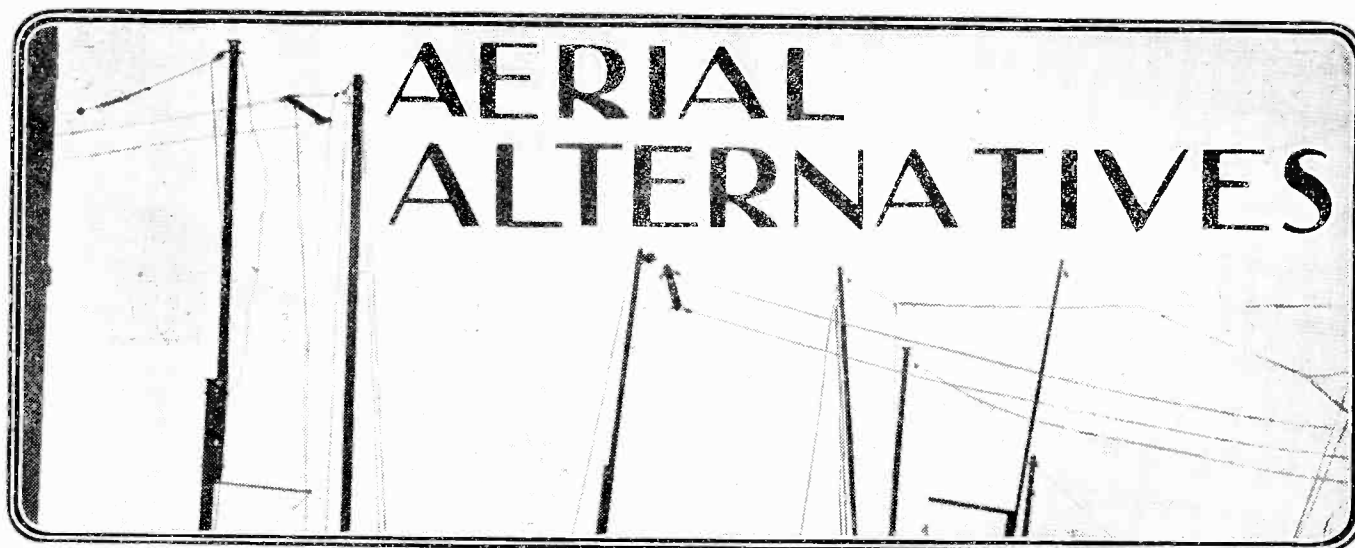
A cursory examination of this receiver will convince the amateur that it is the last word in set design, and that not for a long, long time will another receiver be designed which will make it out-of-date.

Be sure to get next week's copy of
"POPULAR WIRELESS"

Don't miss this opportunity, but learn how to build cheaply and quickly a receiver which will open up new possibilities for you in the art of radio reception.

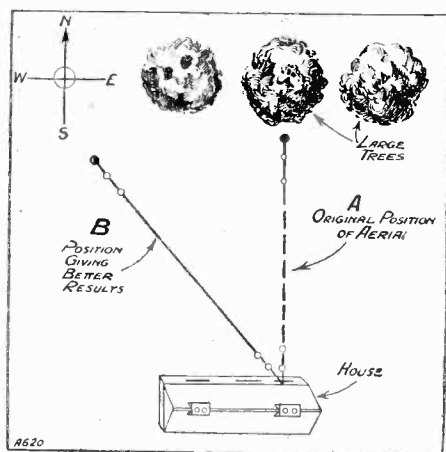
**USUAL PRICE
THREEPENCE**





HOW many readers put up an aerial when they first installed wireless sets, and have been content to let it remain exactly as it was ever since? A good many, I am willing to wager.

The position chosen for an aerial by anyone who has just started wireless depends usually upon two main considerations: (1) where the mast will be least in the way, and (2) where it will be least unsightly. Up goes the mast in a chosen place, the aerial is erected and reception obtained, though it by no means always follows that the best is being got out of whatever the set may be used in conjunction with the aerial occupying the position thus chosen for it.



The diagram illustrates a case in point. Some time ago a friend of mine put up an aerial in the position shown at A. The work of erection took place in the autumn, and he had no particular quarrel with his set for some months. When, however, the gay spring came along he began to feel that though his neighbours could hear the Northern stations quite well he was becoming less and less able to do so. Can you spot the reason why?

Trees Cause Screening.

What was happening was simply this. During the colder months the trees, devoid of both sap and leaves, did no particular harm; but in the spring, as their trunks and branches became filled with moisture and the covering of leaves grew denser and

The position and form of your aerial seriously affect your reception, and an easily-made alteration may make your results very much better.

By R. W. HALLOWS.

denser the trees formed an admirable screen from the north.

So pronounced was the screening effect that so long as the leaves were on the trees he was almost as severely handicapped as if he had reduced the number of his valves by one. The case was so interesting that he and I spent a considerable amount of time in experimenting with aerial positions, using as temporary masts very light jointed poles. We eventually found that the position shown at B in the drawing gave very much better results, and that reception was well up to the average all through the year.

The Interference Problem.

Trees are by no means the only form of screening that one encounters when erecting an aerial. High walls or buildings may blanket it just as effectively, and should the buildings be iron-framed the results may be even more surprising. If, therefore, you want to have, as doubtless you do, an aerial that will really give an efficient receiving set a chance of showing what it can do you will find it well worth while to experiment a little with the position of your mast.

Other interesting points arise in connection with aerial experiments. Do not reach down for a half-brick when I say that it is possible for an aerial to be too good. In certain circumstances this is really a fact. The higher the aerial the more efficient it is as a collector. But don't forget that if it collects signals that you do want it also collects those that you don't.

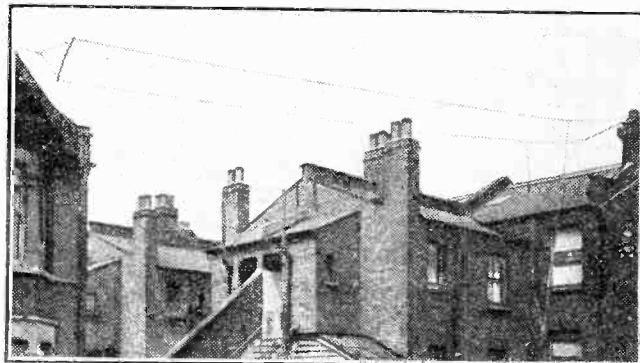
There is, in fact, no finer picker up of spark signals than the lofty aerial carefully erected with a view to the utmost efficiency. Those who live near the sea or in any neighbourhood where spark interference is bad may find it worth their while to experiment with lower aerials than they are at present using.

With the aerial in the worst position for the local station ample signal strength will be secured, but it will be far easier to cut out these powerful signals when long-distance work is toward.

Improving Selectivity.

Now as regards selectivity. An enormous number of the aerials that one sees have a very long "roof" (the roof is the horizontal portion) and consist of two, three, or even more parallel wires. If your set can only just bring in the local station with the volume that you desire then the long-roofed, multi-wired aerial may be what is needed. On the other hand, where there is plenty of power in reserve it is generally far better to use a single wire and to make the roof portion not over long.

My own station is roughly thirty miles north-west of London. As the aerial was first put up a good many years ago, it consisted of two parallel wires with a roof some 80 ft. in length. Since then I have reduced it to a single wire with a roof of only 40 ft., and I find that whilst there is no diminution worth mentioning in signal strength, selectivity is enormously improved.



A twin-wire aerial which passes over a fairly considerable expanse of roof may be insensitive, and no more sensitive than a single wire aerial similarly placed.

LATEST BROADCASTING NEWS.

PRESS VERSUS B.B.C.

**EMPTINESS; OR VACUUM—
STRANGE BIRTHDAY HAPPENING
—POLITICS FOR WOMEN—THE
LORD CHIEF JUSTICE TO BROADCAST—A SALVATION ARMY APPEAL—INDIAN NATIVE DRAMA BY
RADIO—ENGLAND v. IRELAND AT
TWICKENHAM.**

Press versus B.B.C.

THE mistake of the B.B.C. in expanding its publications beyond the point of necessity produced the explosion frequently prophesied in this page. It is probably true to suggest that Savoy Hill would have been glad to have dispensed with the "Literary Weekly"; but the very thoroughness and unanimity of the Press campaign made early withdrawal difficult if not impossible.

Now that a new concordat has been reached it is interesting to reflect what might have happened if events had taken another course. The newspaper interests made no secret of their intention to weaken the B.B.C. in every way possible.

They would have begun by demanding advertisement rates for the publication of broadcasting programmes. Simultaneously they would have attacked the B.B.C. monopoly and insisted on it becoming the major election issue next June. Realising the possibility of "war" the B.B.C. had laid its counter plans. The microphone was to be used against the Press. One wonders what would have happened. It would have been a nice test of strength. In addition, it is believed the B.B.C. was ready to withdraw all information from the hostile Press, to suspend the news agreements, set up a competitive news service with bulletins at any time, and create its own printing and distribution facilities.

While hostilities on this wide scale are deferred because of the arrangement of the joint committee, it remains to be seen whether it is only an armed truce preliminary to a devastating campaign. There is much bitterness on both sides.

Emptiness ; or Vacuum.

A limited number of the public will be admitted to the Bournemouth studio on Tuesday evening, January 29th, when Sir Oliver Lodge gives an address on "Emptiness; or Vacuum." An informal discussion in which Sir Oliver will take part will follow the address.

Strange Birthday Happening.

It is an almost inflexible rule that birthday greetings are broadcast only to members of the children's radio circles. Past experience showed the wisdom of this decision in a few isolated instances of grown-ups using this happy medium of entertainment for their own unworthy ends, thus revealing the fact that some people are more ready to display stupidity than sense.

But when a letter arrived at the Cardiff Station a few weeks ago from some children asking that their grandfather's birthday should be "read out" on Monday, January

7th, the officials after due consideration decided to stretch a point. It was the old man's 91st birthday, and he was a Welsh bard. So it happened that his name was included in the list on his birthday and a special message in Welsh was sent to him, together with the usual good-night message to the children, "Sleep well, pleasant dreams."

The following day the broadcaster was spoken to by a listener in Swansea who said, "I heard your words to Merfyn. They were very appropriate. Evidently the family forgot to tell you he was dead." Grandfather was buried an hour or so before his birthday greetings were broadcast.

Politics for Women.

The uncertainty of the way in which the thousands of new women electors will vote at the General Election which, according to the most recent prophecies, will take place in June, is the vital factor of the hopes and fears of our politicians.

Who can say that broadcasting will not play an important part in returning the next

NOT A "TITANIC" TASK!

A view of the construction of the "Titan" Three, to be described in "P.W." next week.

TECHNICAL NOTES.**VALVE CHARACTERISTICS**

SPECIAL CONDITIONS—MAKING A CHOICE—ETC., ETC.

By Dr. J. H. T. ROBERTS, F.Inst.P.

Valve Characteristics.

ALTHOUGH the operation of the ordinary triode or three-electrode valve is now quite generally understood by the vast majority of radio enthusiasts, there are still a number who sometimes have difficulty in appreciating how valves even of the same general type may have totally different characteristics.

Owing to this fact, although the general principles of the operation are identical, they may and do operate entirely differently, according to the conditions in which they are used. For instance, everyone knows that some valves are specified for a high amplification factor, whilst others are principally characterised by low impedance.

Government, by the series of talks and debates for women voters that have been going on for some months. Another debate is in the London programme for Tuesday evening, February 5th, when Mrs. Abbott, Chairman of the Open Door Council, and Dr. Marion Phillips, Chief Woman Officer of the Labour Party, will discuss "Protective Legislation."

The Lord Chief Justice to Broadcast.

The Lord Chief Justice of England (Lord Hewart) has several times spoken at functions which have come into the programmes as outside broadcasts. Lord Hewart will be heard again by 2 L O and 5 X X listeners on Thursday, February 7th, when he speaks at the annual dinner of the Dickens' Fellowship at the Piccadilly Hotel.

A Salvation Army Appeal.

Commissioner E. J. Higgins, Chief of the Staff of the Salvation Army, who was nominated as President of the Committee of five which General Booth suggested to the High Council should manage the affairs of the "Army" until he himself is able to do so again, is to give the address at a service to be held by the Salvation Army in the London Studio on Sunday evening, February 3rd. The service will be followed by a self-denial appeal on behalf of the Army's funds.

Indian Native Drama by Radio.

A translation by Sir A. Monier-Williams of Khalidasa's "Sakuntala," an Indian native drama written, it is believed, about the time of Christ's birth, will be broadcast from London on Wednesday, February 13th. The play has been acted by Indians for hundreds of years and was once produced in England, Mr. Howard Rose, a member of the Productions Staff at Savoy Hill, taking part in it.

England v. Ireland at Twickenham.

The running commentary on the England versus Ireland Rugby match, which takes place at Twickenham on Saturday, February 9th, will be broadcast from London and Daventry.

Special Conditions.

In view of the almost bewildering variety of data available in connection with the many types of valve now on the market, it is not surprising that beginners especially should find themselves rather at a loss to know which valves to choose for any particular purpose.

Making a Choice.

It would take a long time to go into all the details of the different conditions which arise and the way in which these affect the choice of the most suitable valves. Moreover, many excellent articles on different

(Continued on page 1080.)



The Studio is velvet draped!

TO SECURE SILENCE IN THE BACKGROUND

and the way a Lissen Transformer amplifies, keeps that background just as silent as it was in the Studio.

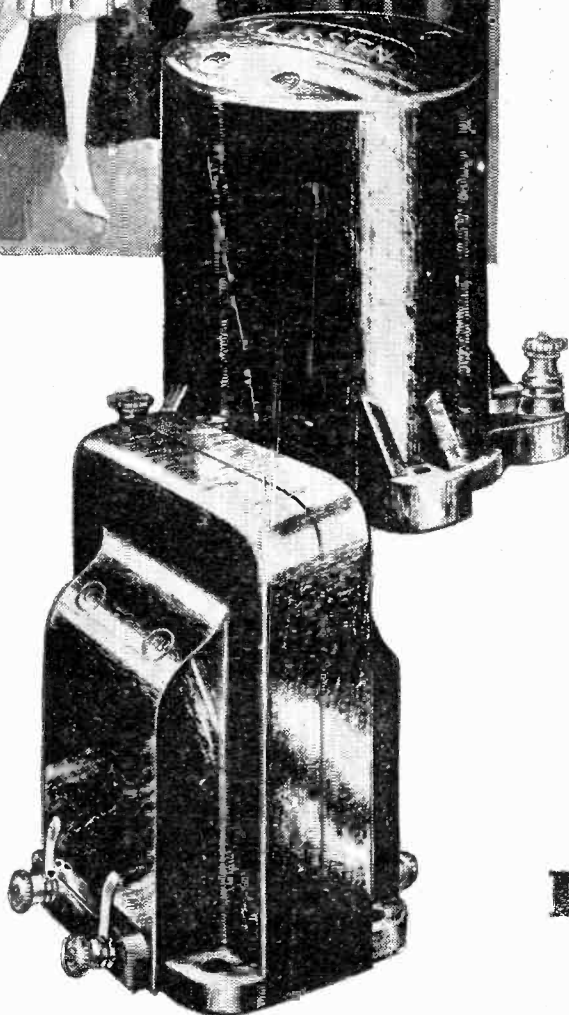
The acoustic experts of the broadcast studios use every effort to obtain a background of absolute silence for each item of the programme. To obtain the same effect from your receiver, use Lissen Transformers for each stage of amplification. Then you get a silence upon which the broadcast instrument or voice can paint a living picture, building up the melody without a trace of extraneous sound to interfere with it, every word and every note standing out in stereoscopic relief.

Lissen Transformers can be used in every receiver and in every published circuit—use them whatever receiver you are building and you will always get the true effect of every broadcast item.

The famous 8/6 Lissen Transformer has won for itself the reputation of "The Transformer that will never break down." Suitable for all ordinary purposes. Turns ratio 3 to 1. Resistance ratio 4 to 1. **8/6**

THE LISSEN SUPER TRANSFORMER

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 **19/-** for both ratios.



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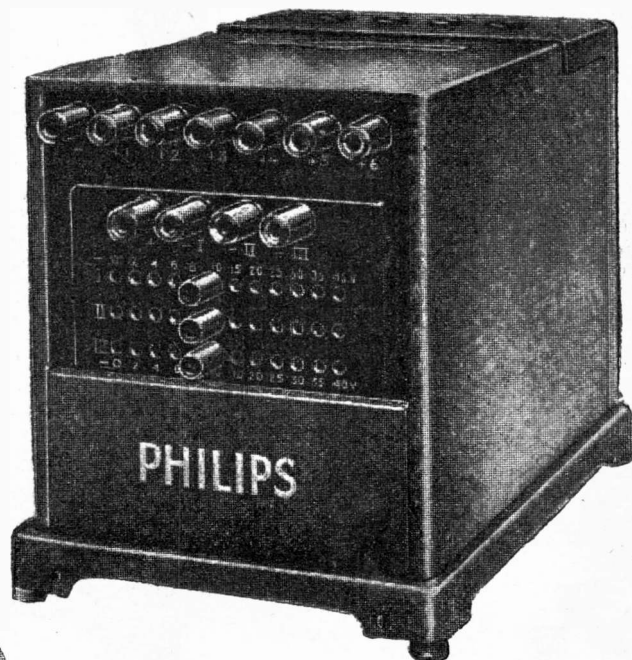
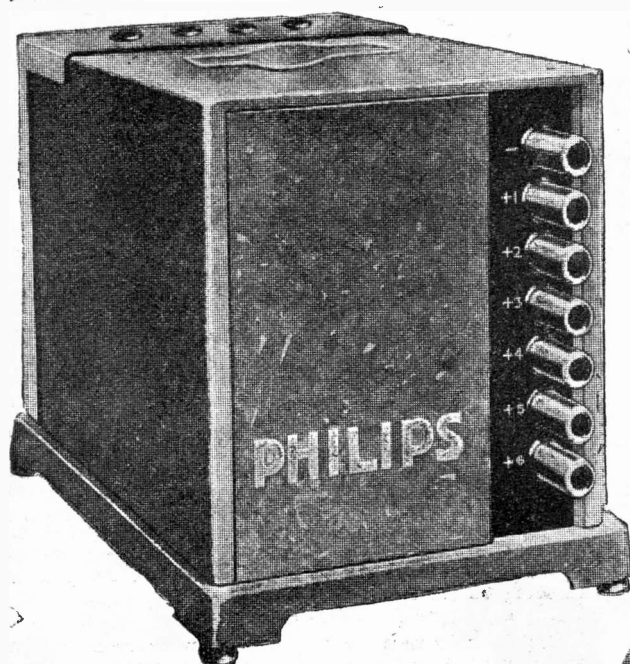
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Ask your dealer for further particulars.

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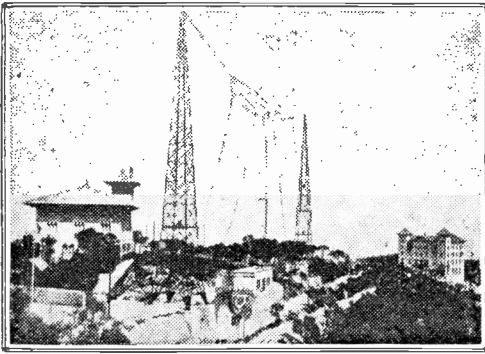
6 different positive anode voltages. Price complete **£7.0.0**

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For H.T. and Grid Bias Supply. Similar in design to Type 3002 with the addition of 3 different variable tapplings, giving voltages between 0 and 40 Grid Bias. Price complete **£8.15.0**

PHILIPS

for Radio



RADIO BARCELONA

Some interesting details of one of Europe's most popular broadcasting stations.

From A SPECIAL CORRESPONDENT.

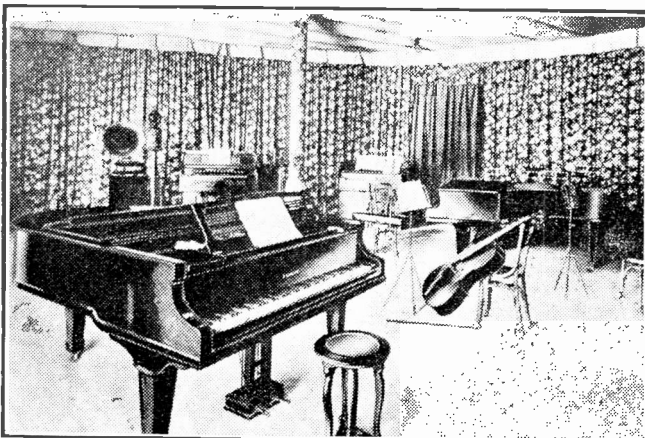
MORE things come from Barcelona than the proverbial filberts. In the radio line, at any rate, the town is famed for the possession of a radio broadcasting station which is second only in importance to the Madrid station.

Most English amateurs, I would imagine, are familiar enough with the Madrid station, EAJ 7, and probably a goodly number of them have been able to pick up Barcelona during their nightly radio tours around Europe. After all, the station is not a difficult one to pick out of the radio medley of Europe. Transmitting on a wave-length of 344.8 metres (or, if you prefer it, 870 kilocycles frequency), the Barcelona station, EAJ 1, is on the air during the greater portion of every evening, and very frequently during the daytime as well.

The entire equipment and organisation of the Barcelona station is owned, controlled, and operated by the Union Radio of Spain, a radio organisation which has been active in that country from the very earliest days of broadcasting. In fact, Radio Barcelona was the station with which the Union Radio commenced its activities in the broadcasting of general entertainment, this inauguration taking place early in 1924. Thus, for all practical purposes, we may say that the Barcelona broadcasting station was the first of its type to be erected and operated in the country.

Some Aerial

High up above the town of Barcelona, the twin aerial towers of the station stand out over the countryside, comprising a landmark with which every traveller in the neighbourhood cannot but have noticed. The aerial system of the station comprises a four-wire "flat-top" span, the aerial itself being of the T-type and possessing nearly 130 ft. of down-lead.



The Barcelona studio from which many a lively jig and jazz tune has been broadcast over Europe.

At the foot of the steel towers supporting the aerial lies the transmitting house of the station, a building which, in addition to containing the usual generating, operating, and control rooms, also contains a very elegantly appointed studio.

The Lady Announcer

Hardly a musical celebrity in Spain is unfamiliar with the Barcelona studio, with its heavy draped walls and roof. At the time of writing, however, plans are on foot to pull down and re-erect this studio on more extensive and up-to-date lines, the present apartment having become too small and unnecessarily inconvenient for daily use. Yet the permanent studio at Barcelona is a happy sort of affair, and, as the reader will observe from the photograph, there are many studios which, to say the least, are far worse.

I suppose I must say something about the transmitter which operates the Barcelona station, although this technical department of radio is rather beyond my province. Anyway, the station obtains its initial source of power from the local electrical mains, subsequently stepping-up and modifying the initial energy by means of a series of motor generators. Like every other station of any importance, an emergency generating outfit is maintained, this being operated by a petrol motor.

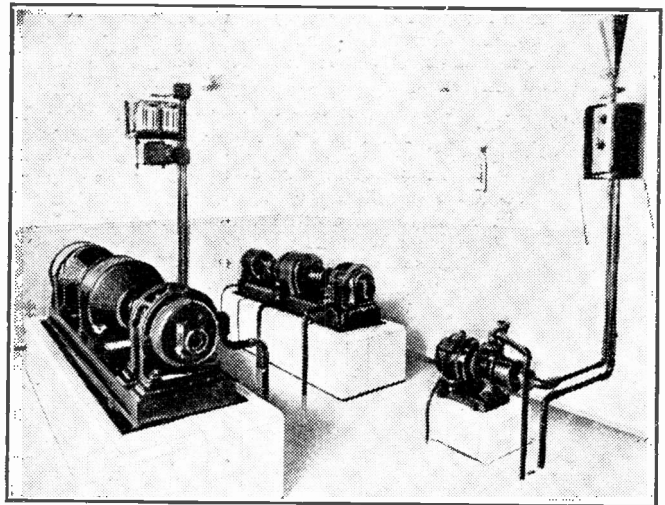
Then concerning the transmitting equipment proper. It is of the ever-popular Marconi type, built in unit fashion, and effectively caged in along both sides of the room. The transmitter sends up into the aerial a power of 1½ kilowatts, this being the operating power of the Union Radio's main station at Madrid.

The transmitter controls are arranged on a special series of panels in much the same way as they are found in any other station, but, in the case of Barcelona, there is a sort of system of dual

control, by means of which the majority of the transmitter's controls can also be worked from a smaller room adjoining the studio proper.

Barcelona is rather famed for its lady announcer. Have you heard her calling? Listen-in for the station about 10 p.m. some evening, and you will probably hear the female voice calling "Allo! Allo! Aqui estacion Radio Barcelona—Eh-ah-hota oono," the latter being spelled phonetically, and meaning, of course, EAJ 1, the station's call-sign.

Radio Barcelona generally closes down about midnight, ending sometimes with the playing of the Spanish National Anthem and at other times with the momentary



Some of the power-house plant at EAJ 1, Barcelona.

relaying of the chimes from the local cathedral.

Union Radio, EAJ 1, Barcelona, has, however, its competitors, although, during recent times, a working arrangement has been effected between the rival stations.

Goodnight Everybody

This state of affairs in Spanish broadcasting, however, renders it a matter of some difficulty for the amateur in England to identify accurately the Spanish station which he has picked up. However, if one keeps on the alert for the call-sign of the station, which is announced every few items with unfailing regularity, the information gained thereby, together with a reference to a book of European stations, will generally enable the amateur readily to identify the station in question.

And now, *Buenas noches a todos*—Goodnight, everybody! Radio Barcelona, EAJ 1, may not be built on the scale of the American stations, or even on that of 2 L O, but, all the same, it is one which is certainly worth while looking out for if you want a pleasant programme of music, sweetly rendered.

THE PARIS PROGRAMMES.

The Plight of Eiffel Tower—Further Television Tests to be Made?—Post Office Said to be "Satisfied."

By THE EDITOR.

IT came as a surprising announcement that broadcasting from the Eiffel Tower would cease at 9 p.m. on January 12th in order to avoid inconveniencing listeners in Paris. The Eiffel Tower is probably one of the most famous wireless stations in the world, and has, as our readers know, been transmitting since January 1st on the new wave-length of 1,485 metres. A considerable number of complaints have been received in consequence of the change by the French and British broadcasting authorities. Especially in Britain was this change of wave-length objected to because the danger of interference between the Eiffel Tower and Daventry was enhanced.

The Eiffel Tower was originally working on a wave-length of 2,650 metres which, for most ordinary wireless sets, was outside the wave-length range. At that time, when the wave-length was chosen, ships used only spark stations with wave-lengths between 600 and 800 metres.

A Difficult Position.

When the ships were fitted with modern high-power transmitting apparatus and began to work on wave-lengths of more than 2,000 metres, in order to cut down interference, the International Wireless Conference held at Washington in 1927 assigned to all European broadcasters wave-lengths between 1,340 and 1,875 metres, and consequently the Eiffel Tower had to conform to these new regulations. Attempts were made to transmit from the Eiffel Tower on shorter wave-lengths, but again this alteration was found to interfere with the wireless service of the Air Transport Line.

In fact, any transmission from the Eiffel Tower over 1,485 metres was found to interfere, not only with Daventry 5XX but with Königswusterhausen and Radio Paris.

Consequently, the Eiffel Tower will have to keep to its wave-length of 1,485 metres, but with the result that it will have to close down every night at 9 p.m. Whether some more satisfactory compromise will be reached in the near future remains to be seen.

Further Television Tests?

We reproduced in last week's issue of POPULAR WIRELESS a notice sent out by the B.B.C. on October 17th, which read as follows:

"In agreement with the Post Office, the B.B.C. required a studio demonstration of the Baird television apparatus before considering whether there should be public experiments in which a B.B.C. station would participate. A demonstration took place at the offices of the Baird Television Development Company, Ltd., on October 9th, and was attended by administrative and technical officials of the Corporation.

"The opinion of the B.B.C. representatives was that, while the demonstration was interesting as an experiment, it failed to fulfil the conditions which would justify trial through a B.B.C. station.

"The Board of the Corporation has decided that an experimental transmission through a B.B.C. station shall not be undertaken at present. The Corporation would be ready to review this decision if and when development justified it."

The B.B.C. asked that all newspapers would reproduce this in view of the fact that a rumour was current last week that an agreement had been reached by the B.B.C. and the Baird Television Company with regard to broadcasting secret television transmissions through B.B.C. stations. However, the B.B.C. emphatically denied that any such agreement had been reached.

A FULL SIZE BLUE PRINT

is given FREE with every copy of next week's issue of "P.W." This magnificent gift is supplemented by a long illustrated article describing the construction of

THE 'TITAN' THREE

a remarkable new receiver which has more outstanding features than any receiver "P.W." has hitherto produced.

DON'T MISS THIS CHANCE
of securing your 'Titan'
Three blue print, but
ORDER YOUR COPY NOW

In reply to the B.B.C.'s re-issued statement and comments, the Baird Television Company also issued a statement as follows:

"In view of the real facts which are within the knowledge of the B.B.C. as well as ourselves regarding the broadcasting of television in conjunction with music, singing, and speech in this country, which facts we are under a pledge of secrecy not to reveal, and have not revealed, we are extremely surprised that such a statement should have been repeated and issued.

"Important negotiations have been successfully concluded with seven important Continental broadcasting stations for the regular broadcasting of television under the Baird system, in conjunction with music, singing, and speech. It is significant that these negotiations were concluded after the experts representing these stations had been to London and thoroughly investigated the Baird system.

"Our system was considered of such importance that within the past two weeks

the German Government sent to London an official deputation consisting of Dr. Bredow, the German Secretary of State for Wireless, Dr. Baneth and Dr. Reisser, leading radio engineers, to investigate the Baird system. As a result of the tests which they witnessed, we have been asked to instal a television transmitter in their Berlin studios for the purpose of public demonstrations, and with a view to their adopting the system generally."

In other words, Germany is going to give the Baird system a trial. What the result will be remains to be seen.

Post Office Satisfaction.

It was also stated by a leading official of the Baird Company that an official report from the Post Office engineers expressing satisfaction with the Baird system is in the hands of the officials of the Baird Company. In which case we suggest that the first thing the Baird Company should do is to issue a copy of this letter for publication in the press.

Further, the B.B.C. state the Baird Company has not yet intimated to the B.B.C. any claim to improvement in their system. The B.B.C. also state that any such claim would be examined with a view to determining whether the B.B.C.'s decision should be modified.

We have been accused more than once by disappointed admirers of the Baird Television system of adopting an unfriendly attitude. But we again point out that we are as much interested as anybody in this country in the progress of television, and if the Baird Company have made definite improvements in the apparatus and system generally, they should at once intimate such a fact to the B.B.C., and, further, should most decidedly publish any correspondence they may hold from the engineers of the Post Office in which, it is alleged, full approval of the system may be found.

The Best Policy.

In any case, however, if the Baird Company are so definitely certain of the efficacy of their present system, then surely their most convincing line of policy would be to await the result of the installation in the Berlin studio of the Baird system, and its consequent reception, favourable or unfavourable, by the German public.

If the Baird system is all that is claimed for it, another invitation should at once be sent to the B.B.C., but if no further improvement has been made since the original B.B.C. test, then the matter should be dropped, and definitely dropped, until such a time as an improvement has been made.

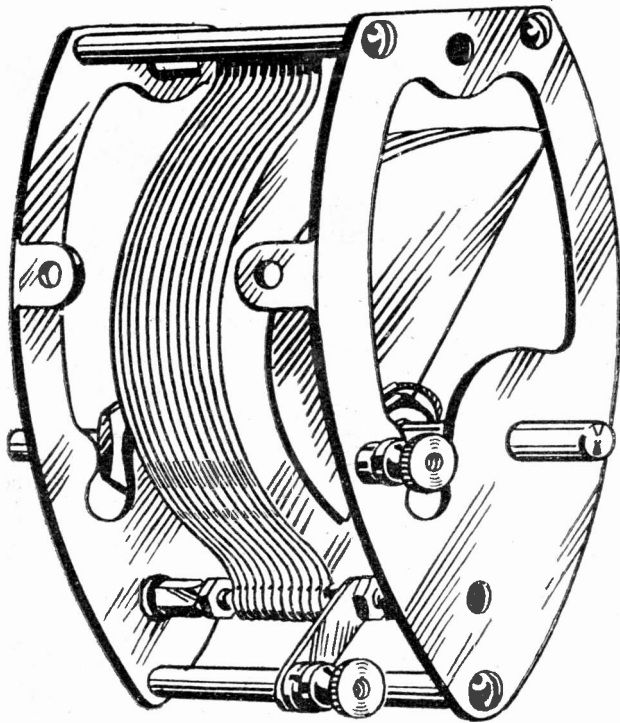
THREE USEFUL TIPS.

When charging accumulators from the mains or other source of electric supply the positive of the cell is always connected towards the positive of the supply.

If you charge your accumulator at home make sure that the charging board is situated in that mains lead which is earthed.

Generally speaking, it is most unwise for any unskilled person to tamper with the electric-light mains, as serious damage can be done by shock and by fire.

Instant public recognition



OF THE OUTSTANDING VALUE
OF THE LISSEN VARIABLE
CONDENSER TEMPORARILY
OVERWHELMED THE LISSEN
PRODUCTIVE ORGANISATION.

THE Variable Condenser which Lissen introduced at the beginning of the season so clearly revolutionised condenser values that trade and public alike immediately recognised that it brought within the reach of every amateur constructor a condenser with technical advantages which had previously been available only in condensers costing in some cases even three times the price of the Lissen.

The result was that even the great Lissen organisation was temporarily overwhelmed with orders; and thousands who wished to incorporate such a low-loss condenser in their chosen circuit were disappointed.

By working day and night the output of this condenser has been increased and increased until now

**AMPLE STOCKS ARE AVAILABLE
AT ALL LISSEN DEALERS**

And the Lissen Condenser which is now available is even better than that which was so well received at first; in the course of manufacture Lissen have found it possible to improve on the original design without increase of cost.

**DO NOT THEREFORE BUY A
VARIABLE CONDENSER UNTIL
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NEW LISSEN.**

A REAL LOW-LOSS CONDENSER

You can use it as a standard condenser in any circuit.

You can gang it—two or three of them together.

You can use a drum control for it instead of a dial.

You can mount it on a panel and it has feet for baseboard mounting, too.

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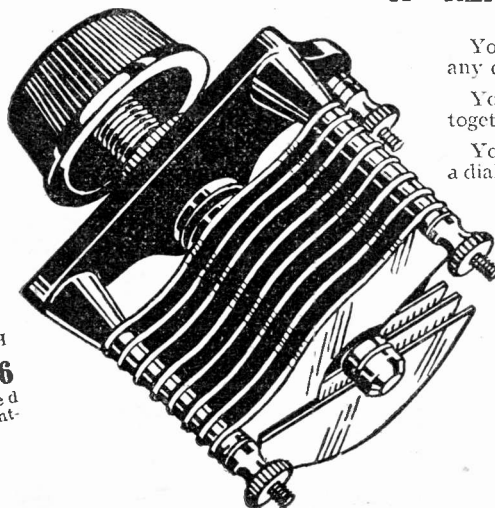
(Managing Director: Thos. N. Cole)

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LISSEN
REACTION
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Embodies many of the exclusive features of the big Lissen Condenser, including no end pressure on any end plate to distort frame or vanes.

Type "A" **4/-**
EACH

Type "B" **4/6**
with insulated bushes for mounting on panel.



If you have a good radio receiver

you can enjoy all the advantages of an expensive electric gramophone for £1.0.0



If you have a good radio receiver and a gramophone (even an obsolete one) you can enjoy richer, cleaner, more lifelike reproduction of gramophone records by fitting the Burndept Electric Soundbox.

Electrical recordings are capable of a much greater volume and have a wider compass. The Burndept Electric Soundbox (working through your radio set) makes the most of these and strengthens every detail.

Ask your local radio dealer to demonstrate the Burndept Electric Soundbox. No other is as good.

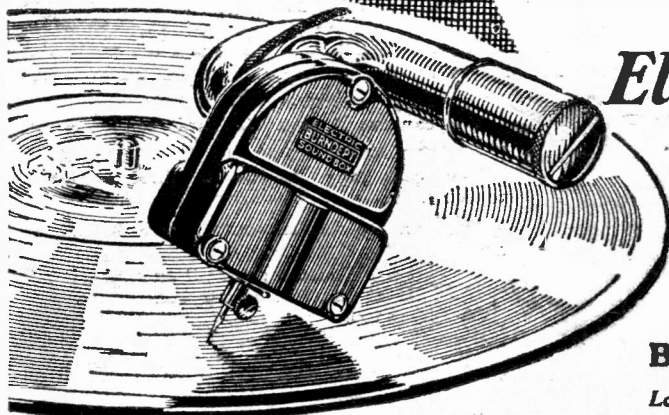
BURNDEPT

Electric Soundbox

PRICE .. £1:0:0

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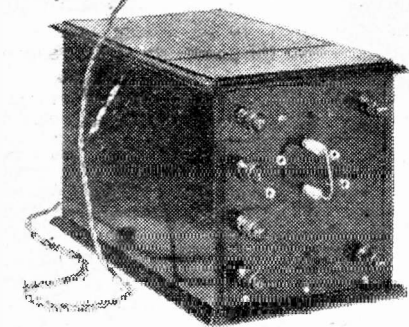
ADAPTER 4:0



BLACKHEATH, LONDON, S.E.3

London Showrooms : 15, Bedford Street, Strand, W.C.2.

STOPPING HUM IN D.C. SETS.



By C. P. ALLINSON, A.M.I.E.E.,
A.M.I.R.E., F.Inst.P.Inc.

rectification is less liable to give rise to this form of interference.

It would appear that this is due to the fact that the usual grid condenser is included in the grid lead, thus keeping the low-frequency impulses from passing on to the grid and being amplified by the detector valve, which otherwise happens when anode-bend rectification is employed.

There are occasions, however, when it is desirable to use anode bend owing to the type of valve to be used as rectifier and the

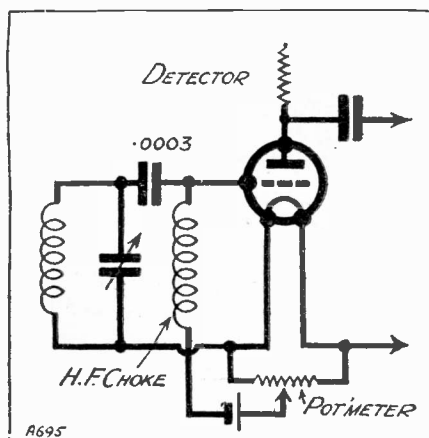
ONE of the main difficulties encountered in working a receiver from mains, especially in the case of D.C. mains, is the hum which is introduced by the rectifier valve.

As you know, in the case of D.C. mains the hum which is experienced is due to commutator ripple, and this is due to a number of different frequencies which are often far more difficult to smooth out than the rectified output from an A.C. eliminator.

The results from hum are particularly bad when a set is being worked entirely from D.C. mains where the filament current has also to be supplied, and a little experiment will usually show that the worst interference is originated in the detector stage.

A Curious Fact.

In the ordinary way one would expect that grid-leak rectification would be far more liable to give rise to interference from hum than anode bend, owing to the fact that the former type of rectification is cumulative; but curiously enough it has been found in practice that grid-leak



type of coupling used between it and the first L.F. valve, and in this case the method shown in the circuit diagram should be employed.

The usual grid condenser is retained, as

this has a stopping-effect as regards L.F. potentials being passed on to the grid.

Instead, however, of a grid leak being used and negative bias being applied to the grid through it, as is very often done, we can employ another method which is far superior.

True anode-bend rectification is not always obtainable when a grid leak is used, even though the correct value of negative bias be applied, owing to the cumulative action in part, and in part owing to the time constant of the grid leak and condenser combination. At the same time, the grid leak presents a high resistance to all frequencies, whether they be high frequencies or low frequencies, in fact, its resistance to the low frequencies will be greater, in view of the fact that its self capacity will then be negligible.

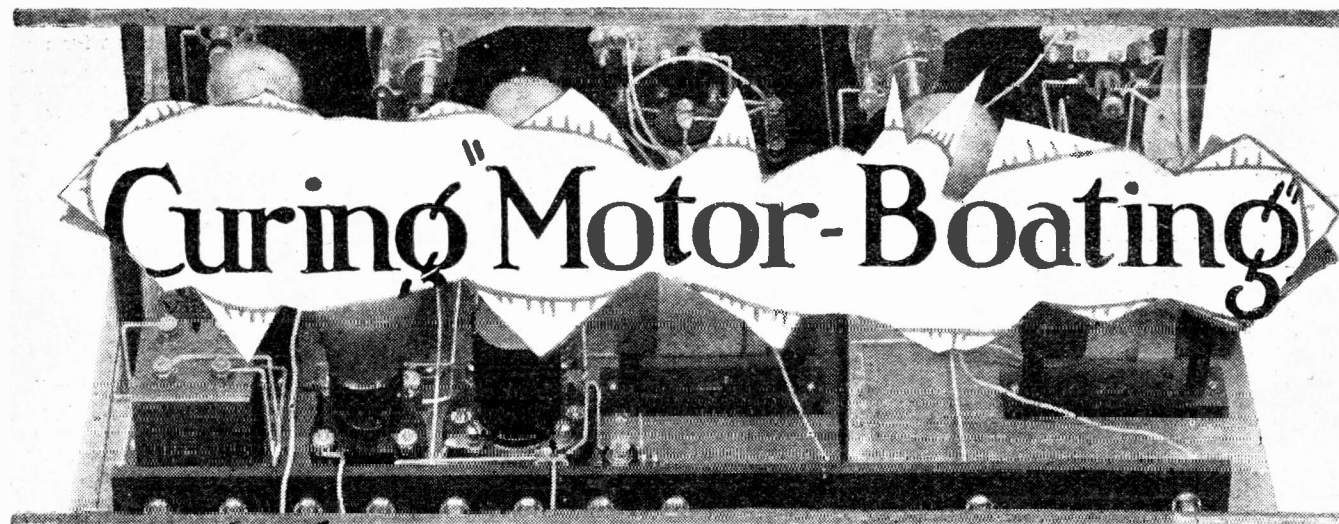
An Ideal Method.

If, however, we connect an H.F. choke instead of a grid leak between the grid and our potentiometer, so as to obtain anode-bend rectification we have what is an ideal method to use in a receiver being worked off electric-lighting mains.

This H.F. choke acts as a dead short circuit to all low frequencies, so that even the small amount of L.F. voltage which may get past the grid condenser on to the grid will be short circuited by this choke. A good H.F. choke, however, presents a very high impedance to the H.F. potentials which you are rectifying. I have made careful tests and no audible difference between the two (i.e. leak and choke) as regards signal strength was noticed.

The H.F. choke further has a low D.C. resistance, thus preventing any unpleasant time period effects, and of course makes it impossible for the grid condenser to charge up.

An H.F. choke is certainly more expensive than a grid leak, but even so, you can get a good one nowadays for about 4s., and it is well worth incorporating it in your receiver on the lines described above.



Most readers know what "motor-boating" is, and that it is always a possibility in some circumstances with mains units, but what about remedies? Here are some really practical instructions for making and using two of the most useful types of "anti-coupling" devices.

By G. P. KENDALL, B.Sc.

HAVE you ever heard the rhythmical "pop, pop, pop," noise from the loud speaker which some unknown genius so aptly christened "motor-boating"? If you have, you will know only too well the feeling of helpless fury which seizes one when a previously well-behaved set suddenly starts to carry on in this way, and will need no urging to study the hints I am going to give in this article.

If you have never run across this aggravating trouble you should first thank your luck, and then resolve to look into the various cures which follow with a view to being prepared in case you do strike it in the future. I am not trying to make your flesh creep, but it may happen to anybody, you know.

It is not at all difficult to cure as a rule, in a perfectly straightforward way, but before we concern ourselves with remedies, it might be a good idea to see what motor-boating really is, because we shall then understand better what we must do to stop it. Well, it is actually our old friend the L.F. howl in a slightly different form, and one of the standard cures for such a howl will often stop motor-boating likewise.

When It Happens.

For practical purposes there is really no need to make any distinction between the ordinary L.F. howl and the slower vibration we call motor-boating. The fact is, however, that a properly designed and reasonably well made set ought not to give an L.F. howl, but certain more or less external factors may start it off, either as a true howl or a slow popping. It is when this happens that we want to know what to do, and that is what I am going to try to tell you.

Now, the usual cause of the trouble is what the highbrows call "back coupling," due to the resistance of the H.T. battery or mains unit, and how this happens is not really difficult to understand. In the case of a battery source of H.T. you will see that the resistance of the battery is included in the anode circuits of all the valves in the set, so "coupling" all the stages together, and producing what is really a reaction effect.

If the resistance is high enough the result

may be actual L.F. oscillation, taking the form of a whistle or slow popping according to circumstances. A rather lower battery resistance, on the other hand, may not be quite sufficient to start actual howling or motor-boating, but may yet produce enough L.F. reaction to have a very bad effect on quality, making it muffled or jarring.

Mains Unit Troubles.

Obviously, then, motor-boating is a thing which may happen with any set containing two or more L.F. stages if no special precautions are taken and the H.T. battery chances to develop a high internal resistance. In the case of a mains H.T. unit, again, it may happen as a natural result of running two or more of the valves from a single positive terminal on the unit. This is often quite safe, of course, but there

comes across sets which begin to howl or motor-boat as soon as the battery resistance rises even a little, and while the battery is still in quite passable condition. Again, if one possesses a mains unit with only two positive taps and it is found to produce motor-boating with a new four-valver, it is poor comfort to be told to buy a new H.T. unit.

Fortunately, there is a simple remedy for these troubles which can be applied externally and works a cure in almost every case. This is the use of an anti-motor-boating filter in one or more of the H.T. positive leads. A device of this sort can be made up for a very reasonable expenditure in the form of a little unit which will prove a very handy thing to have about the house ready for any emergency.

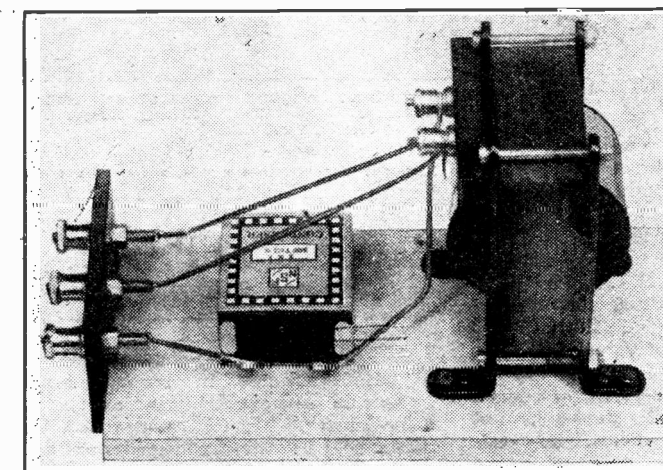
I have two of these units which have proved invaluable of recent months, and the reader may like to have details of them, and some hints on their use. The first unit is a filter of the resistance-capacity type, which is intended for use in series in the detector H.T. lead.

A Useful Type.

This alone will almost always stop howling or motor-boating due to a high resistance H.T. supply, and is by far the most useful of the two. It consists of a small wooden base-board, a strip carrying three terminals, a 2 microfarad condenser, and an anode

resistance of about 50,000 ohms. The terminals should be marked L.T.—, H.T.+1, and H.T.+2, and these are the connections: H.T.+1 to one side of resistance, H.T.+2 to other side of resistance and one side of condenser, other side of condenser to L.T.— terminal.

(Continued on next page)



A simple unit for stopping motor-boating. By using a choke and condenser coupling effects are removed without any serious loss of H.T. voltage.

are occasions when it leads to trouble, and it should not be forgotten as a possible cause.

The obvious remedy for motor-boating, of course, is a new H.T. battery or the use of a mains unit with plenty of separate positive terminals, but this is not always practicable. For example, one occasionally

THAT RESISTANCE QUESTION.

By H. BRAMFORD.

THERE still seems to be an element of doubt about the question of resistance and its application to the filament lighting of valves. The fixed resistor is most commonly used in place of the variable type, but the latter has its advantages as a single control and combined "on-off" switch. The point, however, is this: Is the fixed resistor necessary?

Supposing we are using three 1.8 valves to be fed from a 2-volt accumulator, there are still other points to be reckoned with. By way of example, we will introduce Ohm's Law in the following formulae. Unless the valves are fed from the mains the filament circuits of each valve used will be in parallel.

Very well, then, we must first deduct the voltage of the valve from the voltage of the accumulator, and the remainder is divided by the total consumption factor in amps. of the valves used. Assume that this factor is 1 amp. per valve, the formulae in brief is as follows:

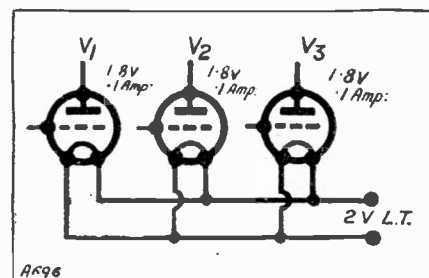
$$\frac{2 \text{ minus } 1.8}{.3} = \frac{.2}{.3} \text{ equals } \frac{2}{3} \text{ ohms.}$$

Resistance then is a negligible quantity, while for two valves the answer would be 1. Only in the case of one valve, then, do we really require resistance.

Existing Resistance.

The reason for this is that we have to consider in our calculation the existing resistance factor of the actual filaments in parallel for which a drop in voltage must be allowed.

In addition to this, however, we have given no consideration at all to the natural resistance of the circuit, as represented in the actual wiring of the set and contact



points, so we are well on the safe side if this simple calculation is followed in all instances.

Using a valve or valves of equal rating to the accumulator, they are in actual fact being under fed, but there is, of course, the satisfaction of knowing that we are working on the safe side.

It is, however, misleading to apply a calculation of this nature to the one valve only, where a single resistance is employed with a number of other valves in parallel.

THREE ACCUMULATOR TIPS.

It is unwise to hold a naked light, such as a match or cigarette, near to an accumulator, and it is dangerous to do so when this is being charged.

On no account should the plates of an accumulator be exposed to the air, as oxidation will tend to make the negatives hot.

When an accumulator's polarity has been reversed (that is to say, the positive has become negative and the negative positive) it has been either excessively discharged or else charged up in the wrong direction.

CURING "MOTOR-BOATING."

(Continued from previous page).

To use the unit, connect it up thus: join H.T. +2 to the positive terminal on the set for the detector valve, connect H.T. +1 to the H.T. battery or mains unit, and the L.T. — terminal on the unit to the L.T. — terminal on the set. Just one point: the resistance in the anti-motor-boating filter drops the voltage on the detector, so remember to allow for this by connecting to a suitable point on the H.T. battery. If your detector valve usually takes about 50 volts, you will probably find that about 100 should be applied when the special unit is used, to make sure that the necessary volts are still reaching the detector.

Simplifying the Battery Leads.

This is really rather a convenience, because it means that in most cases you can give the detector lead the same voltage as that to the L.F. valves, i.e. just join the lead from the H.T. +1 terminal on the special unit to the maximum voltage point on the battery. In practice you will find that this means that you only need one positive connection to the battery instead of two.

This one unit will, as we have seen, cure most ordinary cases of motor-boating, but where it proves insufficient, as may sometimes be the case with a mains unit originally designed for a smaller set than the one in use, another device is needed. This can take the form of another exactly similar unit connected in series with the H.T. lead to another of the valves, but a difficulty arises here.

The point is this: we have seen that a resistance-capacity type of filter drops the voltage on the valve, and this is not always desirable. It does not matter in the case of the ordinary detector, because this valve does not require a high voltage, and we can compensate for the drop by going up to the top of the battery or using a higher tap on the mains unit (by the way, when this device is in use, it is generally quite safe to connect it to the maximum voltage terminal on the H.T. unit, even if other valves are already being fed from that terminal).

In the case of the other valves in the set we usually want all the volts we can get (the H.F. valve is an exception, of course, but an anti-motor-boating device is not often used here), and so a slightly different unit is suggested.

Using a Choke.

True, the same type can often be used if the resistance is reduced to 10,000 or 20,000 ohms, but this is not always sufficient to stop the trouble, and I personally prefer to use a choke-capacity filter instead.

The second of the two units you see in the photos was made up on these lines, and

the only difference is that a good-sized L.F. choke takes the place of the anode resistance. The connections remain exactly the same.

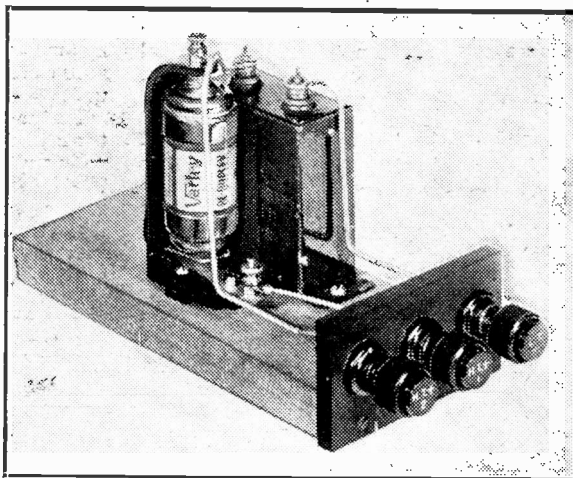
Alterations to Wiring.

The method of using this type of unit is also just the same as before, but it should perhaps be pointed out that you will probably need to break into the wiring of the set to get in series with the H.T. lead to either the first or second L.F. valves. The reason is, of course, that these are usually provided with a common H.T. positive terminal.

The best place to put the unit is generally in the lead to the last valve. This may sound a rather troublesome business, but, of course, it will very rarely be necessary, since the ordinary unit on the detector stage will almost always be sufficient to stop motor-boating.

One final point: the two units described have all their parts and wiring exposed, and although this is probably safe enough where H.T. batteries are used, it is not good enough with mains units.

In this case the unit should be enclosed in a box with a small ebonite top, and the terminals should be of the insulated type such as the Belling-Lee variety.



This unit uses a resistance instead of a choke, and so drops the H.T. voltage considerably. It is therefore of most use for the detector valve feed.

THIS PICK-UP BUSINESS

From A Correspondent.

I AM just an ordinary listener, one who waits until a new thing has really caught on and then decides it is time he tried it for himself. Thus it came about, that after much persuasion I managed to extract a gramophone pick-up out of an expert friend.

Having handed the instrument to me, he asked on what set it was going to be used. I explained it was an ordinary "det. and one transformer L.F." with plenty of H.T. and a modern cone loud-speaker. Imagine my surprise therefore, when he said:

"There's no point in your using an electrical pick-up then," and holding out his hand continued, "so you might as well give it back to me."

However, having got hold of the instrument I intended to try it out for myself, although my friend explained that a set capable of handling great volume, and a loud speaker of the super-quality type (such as a moving-coil) were necessary.

He also explained that a set and loud speaker capable of reproducing frequencies beyond those handled by a gramophone were essentials if a pick-up were to be appreciated. Nevertheless, he told me to go ahead and see for myself. He was partly right but mainly wrong, as the following paragraphs show.

We Start Experiments.

Arrived home, we—that is, myself and others members of the household—got the gramophone out and prepared for the worst. Snag number one, the rubber fitting on the pick-up was not a suitable size for the fitting on the tone arm. So a piece of wood was brought to the rescue and shoved down. Soon we were expertly adjusting the angle of the needle. We made it slope at approximately the same angle as it would if the soundbox were being used.

The next step was to remove the detector valve, plug in the special adaptor and place the valve in the top of the adaptor. It was necessary that one of the pick-up leads went to the negative filament pin of the valve holder. As I traced the wiring out I felt sorry, in a superior manner, for the absolute novice attempting a similar job.

We now started the motor going, placed the tone arm in position, switched on the set and—from the next room came very, very feeble music.

So this was the end of the performance I thought, and imagined myself crawling back with the pick-up to admit my set could not deliver the goods, when my eye fell on the volume control standing on the table.

In the excitement this had been completely overlooked. Just a twist of the knob and good volume poured forth from the loud speaker, easily up to the radio performance.

It was certainly difficult to decide whether it was really better than the gramophone itself, but some cheap records were certainly clearer, and others decidedly more mellow.

The Pick-up Preferred.

At this point in the proceedings, the master of the house walked in and on the spur of the moment we decided to "kid" him. Although he recognised the tunes immediately as being similar to some of our records, he thought they were really coming over the wireless.

The scratch noise apparently was not sufficient to attract attention. Not until the fifth tune did he "twig" what was happening, and amid much laughter he came into the control room to look into matters.

The next one to be taken in was the young lady of the house, but she was naturally more cute, and we only got as far as the beginning of the second record.

Well, that was that! I certainly intend to pawn my present soundbox to get an electrical pick-up. And what fun we had. Yes, I think I must most decidedly invest in one of these gadgets, somehow or other, for although I have not a super set, they undoubtedly hold many attractions as far as I am concerned.



Have You Noticed?

Some curious effects met with in the construction and operation of radio sets, and what they indicate.

From A CORRESPONDENT.

THAT in using condensers with ebonite or bakelite end plates with screened-grid H.F. circuits the set is liable to go into oscillation when the hands are brought up to the two tuning condensers. This is owing to the fact that the body is a conductor, if a poor one, of electricity and, therefore, introduces capacity coupling between the two condensers when the hand is brought up to them, even though the spindles be connected to earth.

That a large condenser such as used in an H.T. eliminator will hold its charge for many hours. Even if short-circuited immediately and so discharged, it will be found after another half hour has elapsed that a further spark can be obtained from it. This is owing to the fact that the energy in a condenser is stored in the dielectric, and what is known as "dielectric absorption" takes place. After the condenser has been discharged this absorbed energy is once again liberated, owing to the reduction in potential, and a further discharge is then to be obtained.

That genuine 27/42 Litzendraht is made up in a peculiar manner. If you examine it you will find that it is made of three main strands. Each of these strands consists of three further strands, which consist of three single wires laid together. If the wire is merely a number of strands twisted together and not made up in this particular manner it is not genuine Litzendraht, and it will not give you the same efficiency when used for winding an inductance.

Avoid Stray Capacities.

That when using R.C. valves with very high anode resistances in the neighbourhood of 1 or 2 megohms it is most important that the stray capacities in the anode circuit be kept down to the lowest possible value. Even a small addition of capacity is sufficient to by-pass the higher frequencies thus resulting in woolly or muffled reproduction of speech and music.

That hard-drawn copper wire or sheet may be softened by heating it to red heat and plunging it into cold water; the result of doing this to copper is exactly the reverse of what happens when it is done to steel. In the case of steel the metal is

hardened, while in the case of copper it is annealed or softened.

That a ribbed former need not necessarily be more efficient than a plain former. The losses are chiefly due to the presence of the dielectric within the field of the coil, and not to the fact that the wire is lying on its surface. At the same time a certain extra amount of efficiency does result from the use of a ribbed former, but the ideal arrangement of course is to use a skeleton former, where the total amount of dielectric is reduced to a minimum.

A Peculiar "Fault."

That the gettering on the inside of a valve may often give rise to trouble from instability owing to its capacity to external objects. In some cases part of the electron emission from the filament may fall on the gettering and charge it up, and produce all kinds of incomprehensible effects.

That it is usually the most obvious faults in a receiver that are the most difficult to trace. Short-circuited condensers, broken windings, and so on, are usually easily traced. But when you forget to connect your low-tension battery, or leave some of the wander plugs out of your high-tension battery, forget to put the aerial on, or forget to connect the loud speaker, then it usually takes about half an hour to find out what's wrong.

That when running a set off an H.T. eliminator, which is only just capable of delivering the full anode current required by the set, speech and music will be overlaid with a queer burbling noise, while the transformer in the eliminator begins to hum loudly. It is advisable that an H.T. eliminator should be capable of supplying nearly twice the current actually required by the set, especially if the set is a big one, and the output stage consists of big valves taking heavy current.

That glass towel rails make very efficient aerial insulators. An 18-in. rail obtainable at Woolworths' for 6d. can be cut in half, the ends heated till soft and then bulged out by pushing the glass rod against something hard, which enables the halyards and the aerial to be fastened on to the glass without the possibility of their slipping over the ends.

These glass rods also have another use in making efficient supports for inductances in short-wave transmitters and receivers.

That an efficient short-wave choke can be made by winding 36-gauge D.S.C. wire on to an ordinary chemical test tube. The ends of the windings are secured by means of a little celluloid cement and the whole choke can conveniently be mounted on a cork fixed to the baseboard of the receiver.

Unloaded Output Circuit.

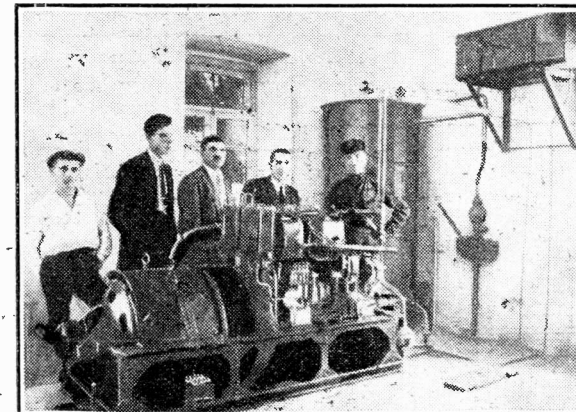
That an increase in H.F. amplification is often to be obtained from a screened-grid H.F. stage, when using somewhat inefficient coils. By reducing the screen voltage this brings the valve on to the negative characteristic of its curve, and so introduces a little regeneration or natural reaction, which boosts up the amplification obtained.

That a faulty moving coil in an M.C. loud speaker is generally indicated by extreme unsteadiness of the milliammeter needle on output, which previously left it completely steady. This is due to a short occurring between layers in the coil, which has the effect of reducing the impedance, and, therefore, reducing the load on the output valve.

That you can demonstrate this fact very clearly by short-circuiting the loud speaker in the output circuit of your set, and watching the milliammeter needle, which will now be found to kick violently, whereas before it was steady.

I once spent three hours on a receiver trying to trace trouble either in the set or in the eliminator through a fault of this description. It wasn't till I put the moving

IN A PERSIAN STATION.



The staff and the generating plant at the Persian Radio station 'Ardis.

coil on the "bridge" and found that its resistance was 600 instead of 1,500 ohms that I traced the trouble.

That there is generally quite a definite difference in potential between an earthed D.C. main and the earth on your wireless set. This may be anything from 5 to 40 volts, depending on the condition of your line the load carried, and so on.

"The bass notes and the drums, on which so much attention is concentrated nowadays, were found to be reproduced in the Amplion 'Lion' in a more natural fashion than by some of the coil drive speakers I have heard, while the notes in the middle and upper registers were always pure, and represented accurately the tonal quality of the instrument producing them."

AMPLION

"LION" CHASSIS

"CRYSTAL," who wrote the above, is the well-known wireless expert and critic of the *Manchester Evening Chronicle*, from which paper the extract is reprinted. His high opinion of the New Amplion's qualities is shared by critics, experts, musicians and listeners everywhere . . . Mr Ernest Newman, the eminent music critic, writes of the "astounding results" obtained by Amplion. "I have had greater pleasure from listening-in than I have ever had before," he says. Dr. N. W. McLachlan, the famous authority on loud speakers, says: "The New Amplion 'Lion' Loud Speaker reproduces sound better than any other loud speaker now on the market" . . . Everyone is agreed on Amplion's supremacy. Amplion means better reproduction, better Radio.

STANDARD CHASSIS

L.14 (14in. Cone). Height 17½ins. £6:0:0
Width 17½ins. Depth 8½ins. ...

POWER CHASSIS

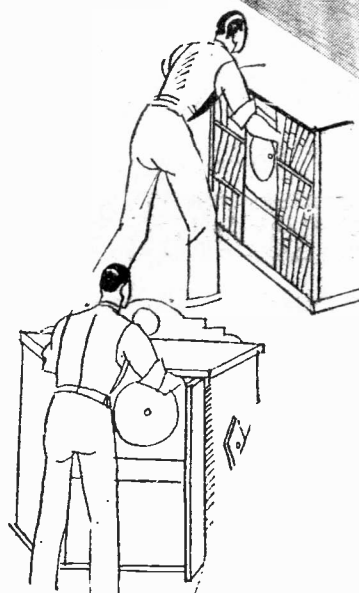
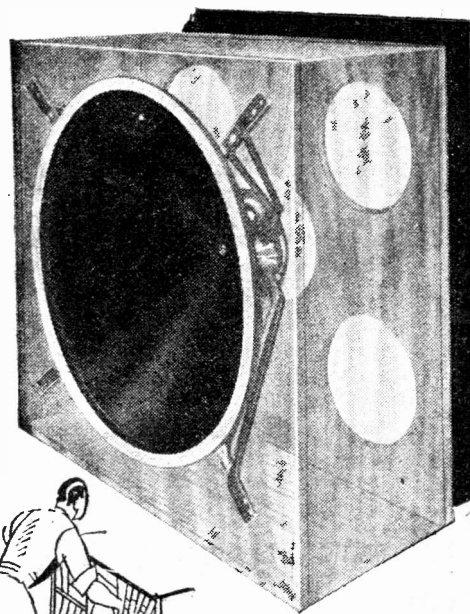
L.18P (18in. Cone). Height 21½ins. £8:0:0
Width 21½ins. Depth 10½ins. ...

The complete Cabinet Models in the New Amplion range are obtainable in a wide variety of designs, at prices ranging from £9 10 0 to £42 0 0.

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LONDON: MANCHESTER: GLASGOW:
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Works: SLOUGH.

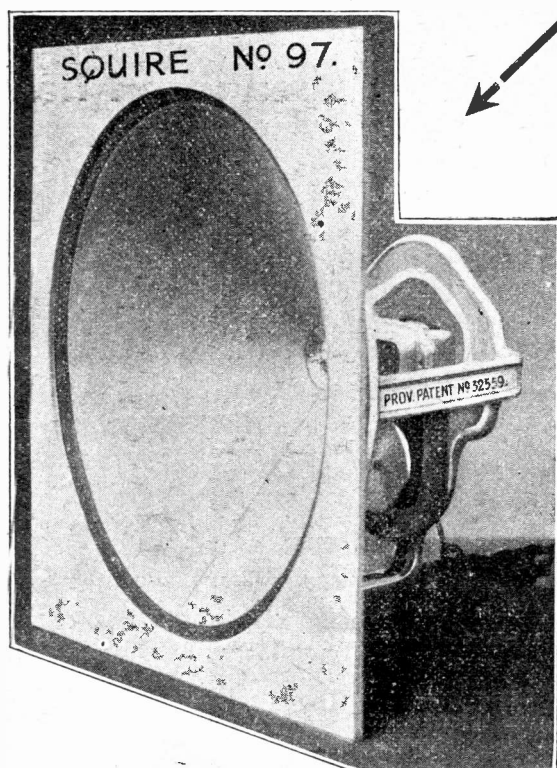


There is no limit to the many ways in which existing furniture can be utilised to accommodate the New Amplion Chassis. Here, for instance, is a book-case in which the Chassis will fit perfectly.

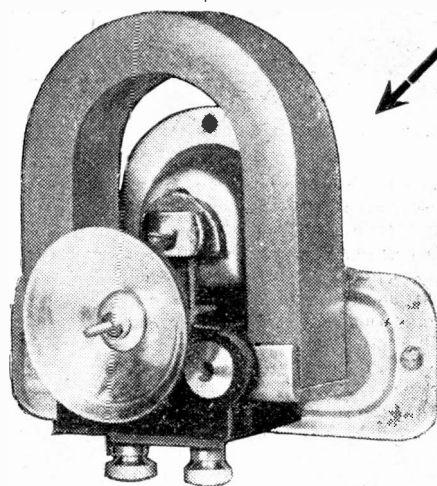
Or that old chiffonier, used nowadays for storage purposes? Why not remove the door, fix a neat curtain, and make a home for Amplion?

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or **BLUESPOT ADJUSTABLE UNIT AND FITTED IN THIS CABINET**

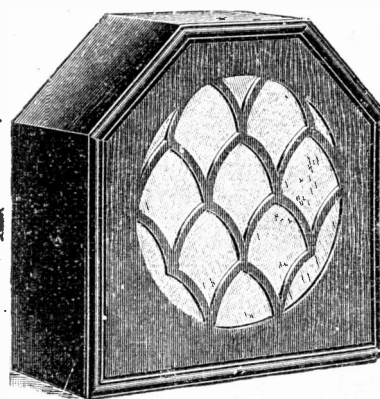
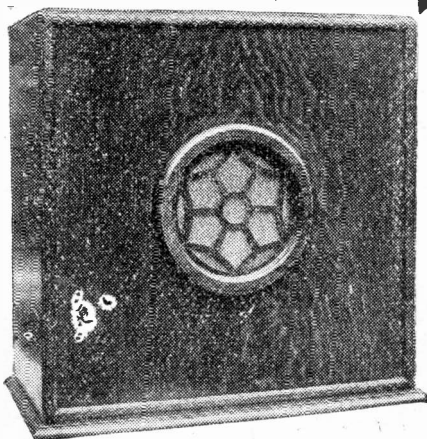
Makes the finest loudspeaker it is possible to construct for any receiver. Complete loudspeaker can be made in less than one hour.

Don't take our word, but ask a friend who has made a loudspeaker from Squire parts and one of the reed units mentioned above what he thinks of it!

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by 10 in. deep
approx.

No backboard, to
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Squire No. 97 Cradle ..	12	6
(And front Plywood Board as shown above at top)		
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Cabinet as illustrated ..	25	0
(Our own make)		
Triotron Unit ..	17	6

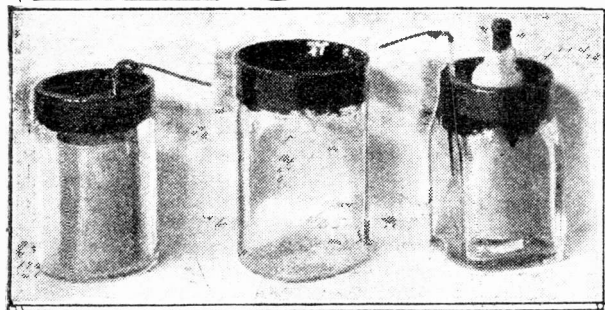
Total cost of parts .. **£2 17 6**

ALTERNATIVE LIST OF PARTS

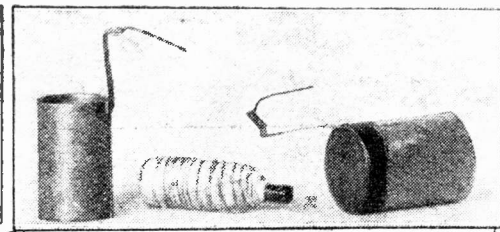
	s.	d.
Squire No. 97 Cradle ..	12	6
Squire 9½ in. Cone Kit ..	2	6
Kabilock Cabinet (W. & T. Lock) Oak, 23½, or Mahogany	27	6
Blue Spot Adjustable Unit ..	25	0

Total **£3 7 6**

LECLANCHÉ'S *for* L.T.



An Article for the
Economist.
By
H. W. DEAN.



THERE must still be many people who do not use valve-receiving sets, for the simple reason that they are out of reach of facilities for charging accumulators. This, in many cases, means that a wireless set cannot be used at all since the crystal cannot provide strong enough signals to make it possible to listen to broadcast transmissions with any pleasure. Or, again, it may happen that the crystal does pretty well, but that loud-speaker reception cannot be obtained owing to the difficulty of using valves.

Two Alternatives.

There are two possible ways in which those who live in remote places may give themselves all the joys provided by the valve set without the use of accumulators. The modern dull-emitter valve requires a very small amount of heating current for its filament, the average nowadays being only about one-tenth of an ampere as against three-quarters of an ampere or more for the old-fashioned bright valve.

There are probably no parts of the country in which an efficient three-valve set consuming about one-third of an ampere of filament current will not provide loud-speaker reception of one or more stations and telephonic reception of a very large number.

Now one-third of an ampere is an amount of current that can be supplied not only from an accumulator or secondary battery, but also from a properly-designed primary battery of suitable size. The two possible methods, then, of heating filaments without an accumulator are to make use either of a dry or of a wet primary battery in place of an accumulator.

Dry Batteries.

The dry battery has several advantages. It is as fool-proof as any battery can possibly be; it cannot be upset and there is nothing messy about it. On the other hand, a dry cell to deliver economically .2 or .3 ampere must be of large size, and since at least two are required for the work even when 2-volt valves are used, the expense is considerable, especially when one considers that once a dry battery is run down it is completely useless and must be thrown away.

The ordinary type of wet Leclanché battery that is used for working electric bells is quite useless for filament-heating purposes, for it is designed to operate only for a few seconds at a time, and then to have a comparatively long period in which

to recover or "recuperate." If placed under a load of, say, a quarter of an ampere for an hour or two, its voltage falls like the proverbial stone since the depolariser cannot deal sufficiently rapidly with the accumulation of hydrogen bubbles about the positive carbon rod.

In order to enable a Leclanché cell to deliver such current for several hours on end without an appreciable fall, the depolariser must be especially effective, and there must be plenty of it. In other words, instead of the porous pot of the commercial Leclanché cell, a very large sac filled with depolarising compound is required. Again, the little zinc rod of the standard cell will not do. In order to reduce the internal resistance of the cell and to provide a large metallic surface for the electrolyte to act upon the zinc must assume a cylindrical shape surrounding the sac and the carbon rod.

A Difficult Problem.

Recently, certain manufacturers of wet cells have devoted a good deal of attention to the problem of producing large cells capable of delivering a fairly heavy amount of current for long periods on end without showing a big drop in voltage.

Only those who have done any work upon the chemistry of the Leclanché cell can appreciate the difficulty of the problem to be tackled. It has, however, been very successfully dealt with and the writer has just

finished a very searching test upon two cells designed for filament-heating purposes, which have emerged from their ordeal with flying colours.

The containers of the cells are glazed earthenware pots with a capacity of about a quart apiece. The zincs are cylindrical in shape and the sacs are very large. The test consisted in discharging each cell continuously through a fixed resistance of 10 ohms.

A Thorough Test.

That is to say, at its beginning the cells, whose voltage was a little more than 1.5 each, were delivering rather more than 150 milliamperes of current.

The test went on night and day until the voltage fell to .75 for each cell, by which time, of course, the current had fallen to 75 milliamperes. No cell in actual use will receive such treatment, for it would be used only for three or possibly four hours a day, and have twenty or twenty-one hours out of the twenty-four in which to recuperate.

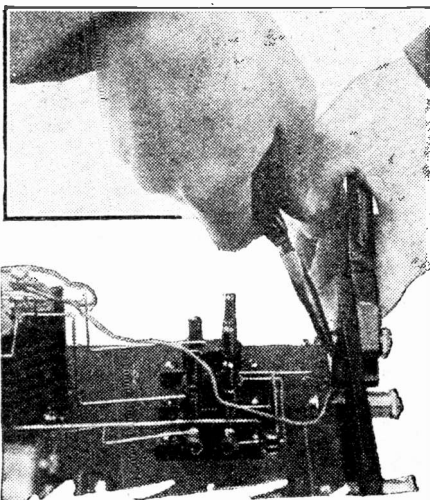
The continuous test, however, is a very good one since it shows up as no other can the way in which cells will stand up to a load, and it finds out any weak spots in the armour of the depolariser.

The results were surprising. Under this load, and with no rest whatever, the average life of the pair was 1,324 hours. The capacity of the cells, then, works out under continuous load to over 100 ampere hours, and this would be considerably greater if the load were intermittent. In other words, one pair should give, on one charge, over a year's working with a single-valve set, from six to eight months with two valves, and from three to four months with three.

At the end of the test the zincs were in pretty good shape and would probably have stood up to as much work again. The electrolyte, however, was saturated and the sacs were found to be practically done for. This means that the first re-charge will necessitate a new sac costing about five shillings, and two or three-pennyworth of sal ammoniac mixed with water.

At the second re-charge, a new zinc will also be required, at a cost of about one shilling and ninepence. Assuming that a pair of cells is used to run a three-valve set, and that re-charging is necessary every four months, expenses over two years work out at an annual cost of about 18s. 6d., or 1s. 6½d. a month for filament heating, which must be regarded as distinctly economical in the circumstances.

TIGHTENING TERMINALS.



Showing how, with two pairs of pliers, terminals can be tightened quickly and effectively.

FROM THE TECHNICAL EDITOR'S NOTE BOOK

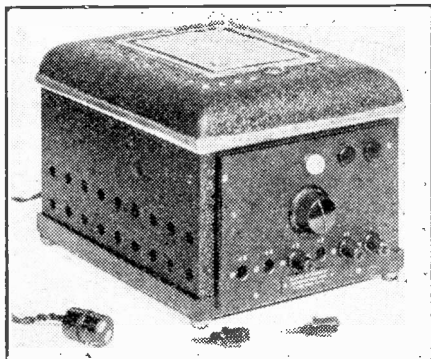
**R.I.-VARLEY MAINS UNITS.**

ONE thing is certain, and that it is that the R.I.-Varley H.T. mains units conform both to the safety regulations governing such devices and to the most ambitious of set users requirements. We are referring specifically to type AY7 for D.C. mains, and AY8 for A.C. mains, samples of which we were recently sent for test. The D.C. model provides four H.T. tapplings; positive 1 makes available a range of 50 to 150 volts, there being a knob on the unit for giving this adjustment. Positive 2 gives 50 volts, 3 gives 85, and 4, 180. This is when the unit is used with a 220-volt supply. The maximum total current is 100 milliamperes.

The A.C. model has five tapplings, up to 220 volts being available in the output. In this case the total current is 80 milliamperes. The A.C. model also has one variable tapping giving a range of 50 to 125 volts. Both models have renewable safety fuses.

The units are compact and they have a far more substantial appearance than most. The workmanship is of course, of usual R.I. standard, and this is tantamount to saying as good as can be. And on test both units functioned exceedingly well. The D.C. type was tried on mains of unusual roughness and the smoothing was found, even in these trying circumstances, to be ample.

The A.C. model operated equally satisfactorily.

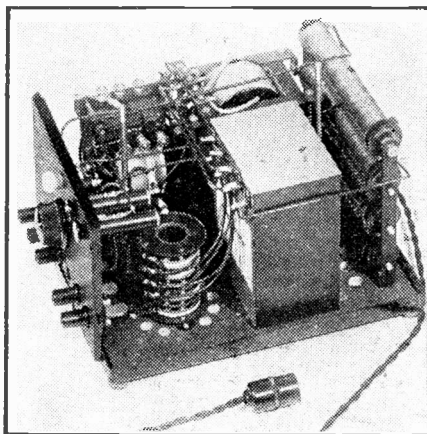


The R.I.-Varley Mains Unit for supplying H.T. from A.C. Mains.

PIONEER BATTERY SWITCH.

Practically every modern valve set employs a battery switch, and small though this item is it is an important one. For one thing it does as much work as any other component, and its potentialities as a trouble-maker are just as great. I have come across a very great number of different makes of battery switch in the course of

the years, and the surprising thing has been that by no means a vast percentage have been really good.



The A.C. Model R.I.-Varley H.T. Mains Unit, with its cover removed.

But the switch recently sent me for test by the Pioneer Manufacturing Co., of Fulwood Place, London, W.C.1, is up to standard. It seems to have a number of those points which one frequently looks for in vain, such as self-cleaning contacts, positive action, and so on. It is of the push-pull variety and designed for one-hole panel mounting. The retail price is Is. 3d.

LASSOPHONE LOUD-SPEAKER UNIT.

Mr. Lassman recently sent us one of his Lassophone Double Reed Forked cone units for test. It is a large unit, and is contained in a well-moulded bakelite casing. On the back are two widely spaced terminals in between which is the adjusting device, this being in the form of a brightly nickelled, milled knob. Three holes in the kind of back plate enable the unit to be mounted easily.

From the front projects the stout rod for fixing to the centre of the cone. Access to the interior of the unit is easily obtained, as it is only necessary to remove one nut and the casing comes away.

Having removed this, the meaning of "double reed forked" becomes apparent. Instead of a single reed or armature, there are two reeds separated by about half an inch. The one operates right inside the gap of the magnetic circuit and the other outside the core. The construction of the unit is sound and everything is on robust lines.

We fixed it to a semi-free-edged cone mounted in the centre of a baffle board

three feet square, in accordance with the instructions accompanying the unit. The results were excellent. The speaker was found to be sensitive, and the response was bright. Additionally, there was creditable bass. We do not think that any amateur buying one of these units and fitting it up in the specified manner but would think that he was getting results out of all proportion to the cost.

A NOVEL SWITCH.

In these days of simplification of panel layout there is real room for a component of the nature of the Junit Multiple-Contact Switch produced by the Junit Manufacturing Co., Ltd. This component actually embodies in one moderately compact single-hole-panel-mounting unit a filament on-and-off and a wave-change switch. Turning the set on and off, and switching from long to short wave-lengths, can be accomplished with the one knob.

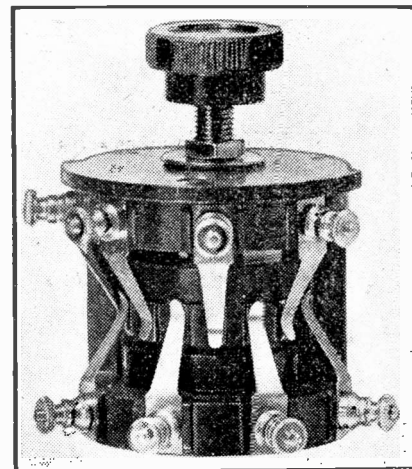
By pushing this knob in and out the set can be switched on and off. The wave-change is effected by giving the knob

Traders and manufacturers are invited to submit radio sets, components and accessories to the "P.W." Technical Department for tests. All tests are carried out with strict impartiality under the personal supervision of the Technical Editor, and readers are asked to note that this weekly feature is intended as a reliable and unbiased guide as to what to buy and what to avoid.

a half-turn when it is in either position. The pulling out and pushing in for the switching off and on processes can be carried out on either wave-range.

The switch was designed specially for use in the Mullard "Master Five" portable set, and the markings on its eight terminals correspond to those specified by the designers of the Mullard set; but the switch can, of course, be adapted to other receivers if desired.

It is a sleek, well-made article, and its multiple contacts are of a self-cleaning, positive character. There can be no confusion between the two switching operations, for the set can be switched on and off when you have switched over to either waveband, the wave change in no way affecting the filament circuit.



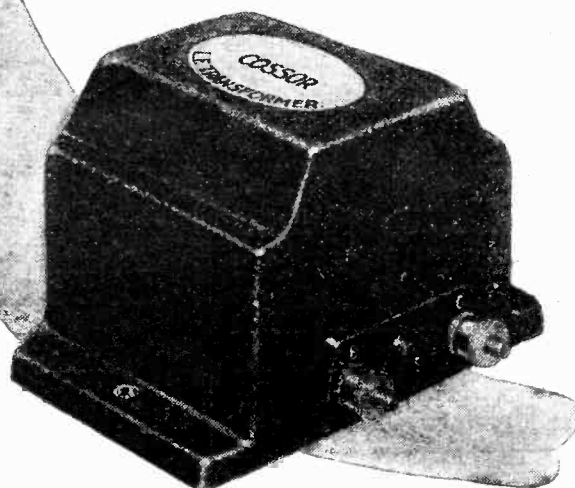
The Junit Multiple-Contact Switch.

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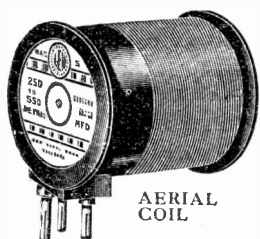
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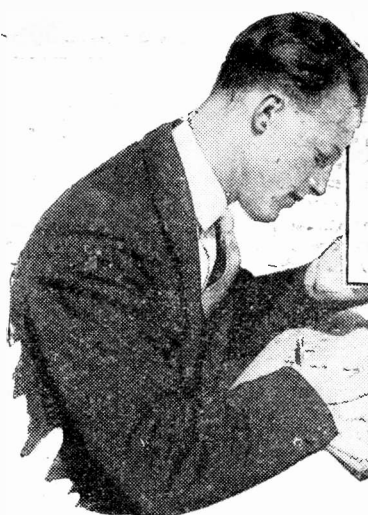
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RADIOTORIAL

An Editorial Communications to be addressed
to the Editor, POPULAR WIRELESS,
Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents Messrs. John H. Ellis, Ltd., 4, Ludgate Circus, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless receivers. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS.

AN ELIMINATOR PRECAUTION.

M. R. S. (Goodmayes, Essex).—"To tell the truth, I am nervous of using the H.T. from the mains because I understand the H.T. positive is earthed, which means that in the event of a condenser breaking there might be a rather serious bust-up. Is there a really safe way of arranging the aerial-earth connections in such a case?"

One of the main safeguards is to use good quality condensers, as if this is done there is very little likelihood of a breakdown occurring here. To make it doubly sure you can adopt the following plan, which will give a very thorough insulation of the set from the mains.

First of all, use an "inductive coupling," which means that neither the aerial wire nor the earth wire need be connected to the set at all. Instead of connecting the aerial lead to the grid circuit of your first valve, connect it to a separate coil placed close up against the grid coil.

To the other end of this extra coil let the earth wire be connected, by means of which arrangement the energy collected by the aerial will be transferred from one coil to the other without aerial or earth-lead being connected to the set at all.

In addition, for safety's sake, you should use the good-quality large condenser in the earth lead as recommended for all eliminators.

Yet another precaution can be taken consisting of a similar condenser (it need not be so large in this case, but its insulation should be good) connected in series with the new aerial coil. That is to say, connected between the aerial lead and the aerial coil, which is coupled to the first valve's grid circuit.

In this way not only is the aerial-earth circuit separated from the set itself, but it is protected both when it enters and leaves the house from any danger due to the proximity of mains.

THE REGIONAL SCHEME.

"INTERESTED" (Willenhall, Nr. Wolverhampton).—"What is meant by the regional scheme of broadcasting, and when is this going to start?"

The regional scheme of broadcasting was put forward by the B.B.C. about a couple of years ago as a suggestion for improving the broadcasting service to all British listeners.

As you know, wireless is comparatively a new thing, and so, when the first B.B.C. stations were erected, there were very few other broadcasting stations on the continent of Europe. Nowadays, as any sensitive set will tell you, there is an immense number of powerful stations on the Continent, and programmes from these stations can be heard clearly all over the country.

If the wave-length of such a broadcasting station is close enough to a wave-length of a B.B.C. station there is mutual interference between the two and the programmes are spoilt by what is called "heterodyne interference." To meet the new conditions which have arisen here and on the Continent, and to provide listeners with better value for their licence money, the B.B.C. suggested that British broadcasting should be distributed not as at present, but by a smaller number of higher powered stations.

The main principle of the scheme has been approved officially, and it was with the idea of attacking the

technical problems that the Daventry Experimental station was started. Valuable experience gained in the operation of Daventry 5 G B has enabled the B.B.C. now to go ahead with the first of the regional broadcasting stations.

The site chosen for this is on the Brookman's Park Estate, not far from Barnet on the Great-North Road. Here the new London station, which will come into operation some time this year, is being built, and it will be the first twin-wave-length high-power station of its kind.

The station will possess two different aeriads and will simultaneously transmit two different programmes, on two different wave-lengths. Other

"P.W." TECHNICAL QUERY DEPARTMENT

Is Your Set "Going Good"?

Perhaps some mysterious noise had appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an unrivalled service.

Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do: On receipt of this an Application Form will be sent to you free and post free immediately. This application will place you under no obligation whatever, but having the form you will know exactly what information we require to have before us in order to solve your problems.

stations of the same type are being planned in different parts of the country, the idea being to cover Britain with a network of high-power stations each sending out two different programmes.

Although the work has actually gone forward to the degree indicated above, the scheme is still somewhat in the experimental stage, and latest news of the regional scheme will be given week by week in "P.W." as it becomes available, on the "Latest Broadcasting News" page.

ADDING R.C. TO THE "EMPIRE" TWO.

T. N. G. (Glamorgan).—"I made up the 'Empire' Two, which was the set described in the Christmas Number of POPULAR WIRELESS, but as I had made up my mind to have a three-valve set when I could afford it, I got a larger cabinet than was necessary and thought I would do with the two-valve at first as I wanted to get a little experience of the short waves.

(Continued on page 1070.)



—the Speaker that lives!

Whatever goes into the microphone, comes through absolutely naturally on the Blue Spot 49 Loudspeaker. No matter whether it is the top note of the piccolo, the deepest thunder of the organ or the middle register of the voice, you get unalloyed tone without distortion. Reproduction is perfect—and this amazing speaker, obtainable from all leading wireless retailers, costs only **£2 2 0**

The secret of its success is the Blue Spot 66Z Driving Unit, capable of handling great volume without distortion, and pleasing results can be obtained with low H.T. values. It can be obtained for home constructors as a separate unit, price **17/6**

For those who own sets of 3 valves or more we recommend Blue Spot Speaker 59. Price £4 4 0, with 66K unit capable of handling any output. Price of unit alone, 25/-.

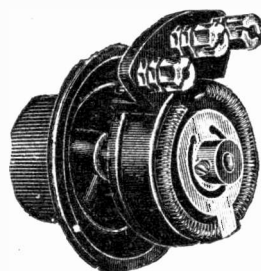
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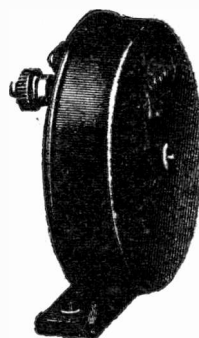
Invaluable for volume control by the high resistance potentiometer method, and for use as a stabilising resistance, variable grid leak, etc. Gives very smooth, even control.

Resistances of 50,000, 500,000 ohms, 1 and 5 megohms. Price 6/- each.

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The self capacity is so low that the IGRANIC H.F. CHOKE may be used for the lowest broadcast wavelengths, whilst the high inductance makes it suitable for reception up to 3,000 metres. Easily inserted in a small space. Price only 5/-.

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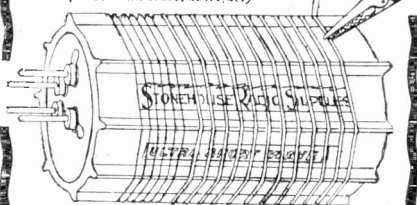
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AERIAL COIL - 7/6 ANODE COIL - 8/6

(Prov. Pat. 29215, 23116/25.)



A screened-grid ultra short-wave set capable of tuning in the world's short-wave stations for 16/- (postage gd. extra) the cost of the

S.R.S. Ultra Short-Wave Coils for the

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Not only do you get this, but **FAILURE IS IMPOSSIBLE** as with each set of coils is given full operating instructions and valuable short-wave hints, and a special department is available to every Cossor "Melody Maker" owner, ready to answer any question or give you free advice and best service. These coils embody unique features exclusively. The only two coils that cover the whole short-wave band. Five to over 100 metres.

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The Firm that made ultra short-wave reception possible on the Original Cossor "Melody Maker" and now lead the way with the New.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1068.)

I am now quite an expert with these and can get American stations with almost disheartening regularity, so I should like to try now adding another valve.

What I had in mind was a resistance stage added to the present set, and I have on hand a '01 fixed condenser mica, an anode resistance, grid leak, valve holder, etc., so if you can give me the necessary wiring in words, I think I can make a good job of it. As the set is good and strong at present, I have got a power valve for the last stage, and I suppose I shall have to increase my grid-bias battery?

Yes, you will need higher grid bias when you get the power valve going, and we advise you to use as much H.T. as you can manage. If you look at the valve-maker's curve for the power valve, you will see the number of grid volts that are necessary for use with the high-tension voltage that you are going to employ.

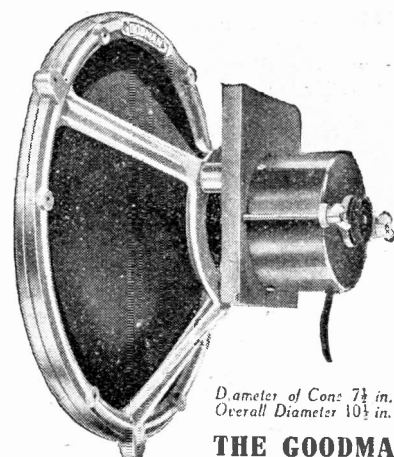
Having purchased a suitable grid-bias battery you can then connect up as follows. First of all mount the valve holder in a suitable position on the base-board, arranging the holder for the anode resistance near to it. Close to the grid of the valve holder mount the '01 mica condenser and grid leak.

You will require an extra H.T. terminal. Label this "H.T.+" and then join the anode resistance to those wires which now go to the loud speaker positive and negative terminals. (The loud speaker, of course, is disconnected from these, and two other loud-speaker terminals are provided, near to the new H.T. positive terminal.)

Having inserted the anode resistance across the points which previously went to the loud speaker, connect that end of the resistance which is now joined to the plate of V 2 to one side of the new coupling condenser '01 mfd. The other side of this condenser is joined to the grid socket on the new valve holder and also to one end of the grid leak. To the other end of the grid leak is fixed a flexible lead which plugs into the grid-bias battery at the required negative voltage.

One of the filament terminals on the new valve holder is taken to the lead on the old set which at

(Continued on page 1072.)



Diameter of Cone 7½ in.
Overall Diameter 10½ in.

THE GOODMAN "SPIDER CHASSIS & CONE," 16/6

(as used in the P.W. Purity Cone—Dec. 22nd, Issue.)

Exclusive Features.

Can be used with any Unit on the market, regardless of make.

The Chassis consists of correctly designed, highly polished, sturdy aluminium castings.

The Cone is of the Goodman Seamless variety, manufactured under Letters Patent. Alternatively a cut out Cone, Leather suspensions, comprising kit recommended by P.W. (Dec. 22nd), can be supplied.

By reason of the exclusive doping processes employed the Seamless Cone actually improves with age. Two minutes constructional work only, and you have a wonderfully efficient Cone assembly, ready for mounting in cabinet, or to a baffle board.

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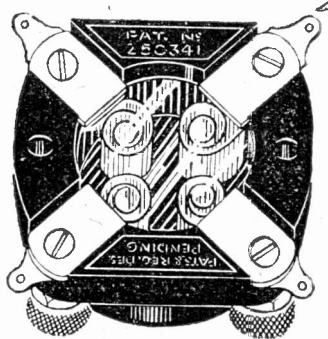
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Price 1/6

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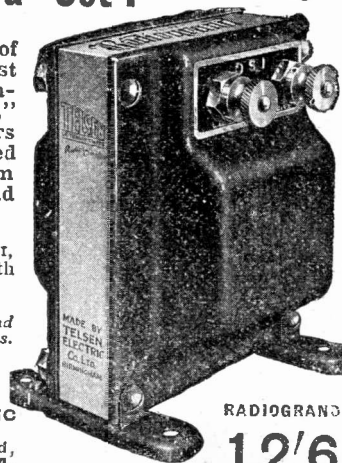
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Ratios 5-1 or 3-1,
Shrouded and with
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Entirely British and
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RADIOGRAND

12/6

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BUY A 9d. TRIAL SIZE
You will be pleased with results.

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MAKERS OF JOHNSON'S WAX POLISH.

High-grade

QUEEN ANNE STYLE FIGURED OAK CABINET

Height 3 ft. 3 ins. - Depth 1 ft. 3 ins.
For Panels up to 21 ins. x 7 ins.
Baseboards up to 11 ins.

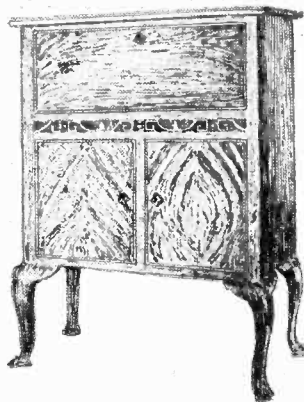
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Manufacturer of all types of wireless cabinets and furniture of every description. Illustrated lists free.

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Estimates Free. Estd. 1866.



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The secret of obtaining powerful, silent, and enduring results from the H.T. or E.T. Eliminator you are about to build depends entirely upon the right selection of its component parts.

Success with SUPRECISION Power transformers and chokes is a guaranteed certainty. Specify them and you follow the lead of thousands of satisfied Customers.

How to build your own Eliminator inexpensively is explained in the new list 935. Any output obtainable from 2 volts to 500 volts.



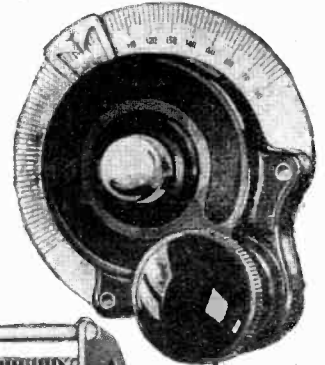
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F.C. HEAYBERD & Co.

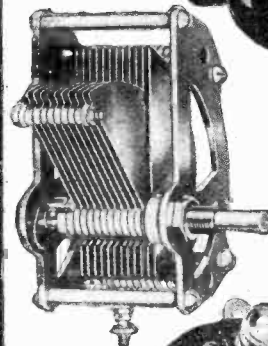
8/9, Talbot Court, Eastcheap, E.C.3.

(One minute from Monument Underground Station.)

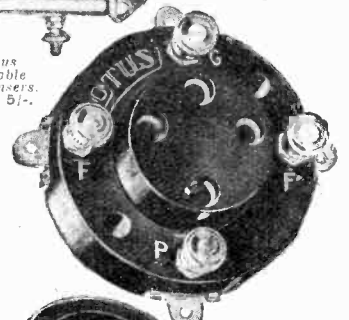
BUILD EVERY SET WITH



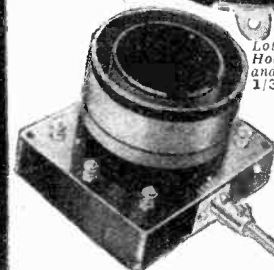
Lotus Verner Dial, 4/9.



Lotus Variable Condensers from 5/-.



Lotus Buoyancy Valve Holders, Miniature and Standard Types, 1/3 to 1/9.



Lotus Dual Wave Coil, now made with lid, 15/-, 18/6, 21/-.

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Made by Garnett, Whiteley & Co. Ltd.,
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National Physical Laboratory Test Report shows Breakdown-8,000 volts



Type 'B', 6d.

But Belling-Lee terminals proved equal to the terrific test and refused to "short circuit." Belling-Lee bakelite insulation was responsible for this remarkable achievement. It will pay you to buy these terminals.

Type 'B', 6d. Smaller insulated model, type 'R', 3d. For instruments where insulation is not important our type 'M' terminal at 4d. is ideal. All types made in 36 different engravings.

BELLING-LEE
TERMINALS

Belling & Lee, Ltd., Queensway Works, Ponders End, Middx.

RADIOTORIAL QUESTIONS AND ANSWERS (Continued from page 1070.)

present joins the grid-bias positive and the two valve filament sockets together, and which also goes to earth, etc. The other filament socket on the new valve holder is joined to the lead which connects L.T. positive to the remaining two filament sockets on the valve holders, etc.

Finally, join up the plate socket of the new valve holder to one of the new loud-speaker terminals (negative) and then join the positive new L.S. terminal to the new H.T. positive. This completes the wiring.

AMATEURS TRANSMITTING ON TEN METRES.

"INTERESTED" (Croydon).—"Can you tell me if any of the London and district amateurs are transmitting on ten metres?"

Many of the London amateurs have been experimenting with transmissions on this new wave-length, the most prominent among them being G2FN, G2KE, G2NH, G2OD, G6HP, G6LL, G2CX, G6QB.

PROVIDING A CHOKE OUTPUT.

R. P. C. (Brussels).—"I have become possessed of a low-frequency choke and I should like to use this for a choke output if you can tell me the correct position for this. Am I right in thinking it is better to use a choke output than to connect the loud speaker direct in the plate of the last valve?"

Yes, we certainly recommend the adopting of choke output, provided that your choke is a fairly "hefty" one capable of carrying the plate current of the last valve without introducing too much resistance, and without saturation (20 henries is a suitable value). If it is a fairly large and heavy choke you can try it as a choke output filter in conjunction with a large fixed condenser.

This condenser should, preferably, have a capacity of several microfarads, but generally one mfd. will serve; and, at a pinch, even a .5 mfd. will give results, although the quality is not so good as with

(Continued on page 1074.)

The Easy Way TO PERFECT RADIO

In addition to their own extensive range, PETO-SCOTT offer YOU Every Known Radio Receiver or Component—all on EASY TERMS

The Peto-Scott Easy Way at last solves your Radio difficulties. Every article known in radio to-day may be obtained on Easy Terms from Peto-Scott, and all leading makes are stocked. In addition, the Easy Way also is available for all kits of parts for Home Construction of sets advertised by leading valve makers and publications, and all "Popular Wireless" sets. Here are a few examples:

COSSOR MELODY MAKER. Send only 10/-, balance in 11 monthly instalments of 14/7. MULLARD MASTER THREE Star. Send only 10/-, balance in 11 monthly payments of 15/3. LEADING MAKES' OF H.T. ELIMINATORS from 4/7 down and balance in 11 monthly payments of 4/7.

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



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THE NEW BULGIN MULTI-COIL

(Patent applied for.)

The choice
of critics



COVERS ALL WAVELENGTHS
FROM 250 TO 550 METRES
AND 1,000 TO 2,250 METRES
BY OPERATING A
PUSH-PULL SWITCH.

Scientifically designed in accordance with modern practice, wireless experts in all parts of the country are unanimous in praise of this New Unit. The range, selectivity and smooth control of reaction have won instant popularity.

It is centre tapped on both ranges and entirely dispenses with plug-in coils. Used with great success in all "Hartley" Circuits. One-hole fixing, and only 3 terminals to connect.

PRICE
15/6
EACH

WRITE FOR OUR SPECIAL MULTI-COIL LEAFLET

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LARGE ALUMINIUM CRADLE FRAME AND CONE KIT

No. 97 15/-

A Plywood Clamping Washer included with each complete set.



For Various Balanced Armature Speaker Units.

The Frame is ready to take Blue Spot, Triton, Bullphone and G.E.C. Units, &c., which are secured rigidly and DIRECT to ALUMINIUM CRADLE or CHASSIS. Setting remains constant and speaker will take full output from set without chatter.

CRADLE FRAME ONLY, ready to receive various units - **12/6**

Designed to give easy access to adjusting nuts on Driving Rod of unit.

CONE KIT, comprising 11 1/2 in. Kraft Diaphragm (forming 9 1/2 in. Cone), 4 Suedlin Segments, 1 Card Ring, all cut to size ready for **2/6** mounting

INSIST ON THE GENUINE SQUIRE CONE KITS, IN LABELLED ENVELOPES

Guaranteed Moving Coil Speaker Resemblance.

The Finest Reception can be obtained from the "Titan" Three with this type of speaker.

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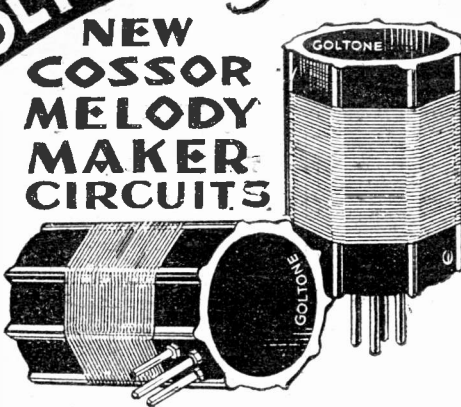
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"GOLSTONE" MULTI-STRAND ASTRA WOUND COILS are superior to others owing to greater self-capacity. Thus ensuring: **Increased Volume, Improved Selectivity, and added range of reception.**

SHORT WAVE (250-600 m.) **10/-** per pair
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From all first-class Radio Stores—Refuse Substitutes. If any difficulty write direct.

Radio Catalogue R.119 A.P.W., sent FREE on request.

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DON'T BE CAUGHT—NAPPING—NOW IS THE TIME TO BUY REALLY FIRST-CLASS EUREKA TRANSFORMERS.

We have no old stocks to dispose of, every instrument is of 1929 manufacture and supplied with a "Money-Back" Guarantee if dissatisfied. Being the actual makers we are able to supply ANY model.

NOTE OUR PRICES compared with usual charges:—

	Ratio	OUR PRICE	Old Price
Concert Grand 1st Stage	(4-1)	10/6	21/-
" " 2nd "	(3-1)	9/6	21/-
Baby " 1st "	(4-5-1)	8/6	13/6
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Post Paid and Guaranteed Perfect.

As good as EUREKA TRANSFORMERS have been our 1929 Model is infinitely BETTER and with our REDUCED PRICES it is IMPOSSIBLE to get better VALUE FOR MONEY. REMEMBER—Out-of-date components are often VERY EXPENSIVE even as a GIFT. DON'T DELAY—Try One, or Two.

Remittances To-day—Goods Delivered To-morrow.

If you have an old EUREKA TRANSFORMER which is beyond further service, let us fit our UP-TO-DATE winding, IT WILL PAY.

Sole Manufacturers: **L. PERSON & SON,** Phone: 63, Shaftesbury St., London, N.1. Clerkenwell 7139.

SCOTT'S ALL-WAVE EBONITE TUNER

Price Now ONLY 13/6 Post Paid

"P.W." Test Report, May 12th.

"On test we found this unit covered the wave-length range claimed—i.e., 180-2,000 metres—reaction control being quite satisfactory throughout. It is nicely made, more robust than the majority, and can only be regarded as an economical proposition at 15/-."

A similar report was published by "Amateur Wireless," June 16th, and "Wireless World," Oct. 10th.



Constructional Details.

Wound with green silk wire on a polished ebonite tube; switch and variable reaction combined; nickel plated parts. Size, 4 1/2 ins. x 3 1/2 ins.

Supplied with wiring diagram, drilling template and instructions. If your dealer does not stock this Tuner, send direct to the manufacturers. Cash with order or C.O.D. All orders despatched same day as received.

S. W. SCOTT & CO., 67a, Lothian Road, London, S.W.9.
 TRADE SUPPLIED. Phone: Brixton 1504.

EVERYTHING **G.E.C.** ELECTRICAL
your guarantee

No Acid to Spill

in the ENTIRELY NEW

"GEEKO"

"U" TYPE

LOW TENSION UNSPILLABLE ACCUMULATOR

with plates totally enclosed in

SOLID ELECTROLYTE

The Ideal Accumulator for PORTABLE SETS

Cat. No.
 0.480
 2 volts
 20 amps.
 (actual)

PRICE:
25/-

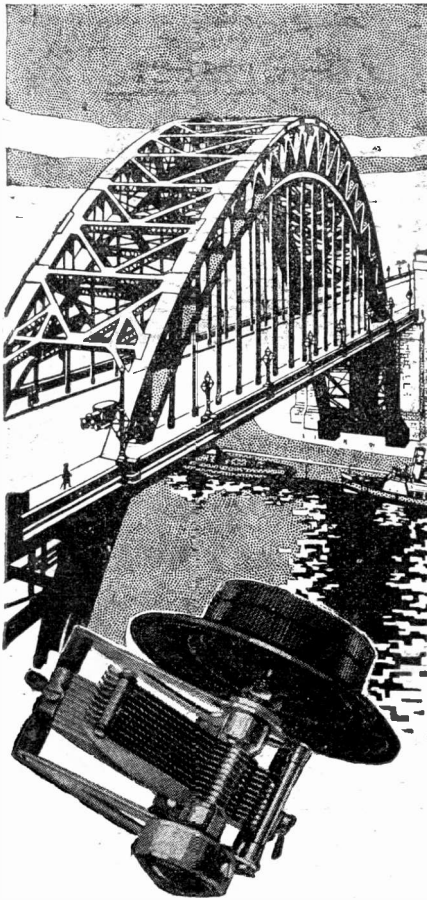
GUARANTEED FULL CAPACITY IN ANY POSITION

Sold by all Wireless dealers

MADE IN ENGLAND



Mk. of The General Electric Co., Ltd., Magnet House, Kingsway, London W.C.2



ENGINEERING PRECISION.

Bestriding the Tyne like a Colossus, this inspiring new bridge leaps the great waterway in one span, a perfect example to Newcastle—and indeed the world—of the skill and precision to be found in twentieth-century engineering.

No less worthy examples of craftsmanship are to be found in the products of J.B. Infinite care and accuracy, and a flair for turning a good design into a perfect one, have raised J.B. precision instruments to an unassailable position of good repute.

The J.B. New type Slow Motion Condenser (Ratio 40-1) is really a wonderful job. The height of the Verrier Knob and Dial is less than that of last year's model, but the new arrangement provides remarkably convenient control, and is vastly improved in appearance. Completely enclosed in dustproof mechanism—a real protection from accidental damage. Tension of friction mechanism adjustable. Absolutely silent on short waves. Every possible precaution has been taken to prevent wear.

Prices : S.L.F.	Prices : LOG.
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**PRECISION
INSTRUMENTS**

Advt. of Jackson Brothers, 72, St. Thomas' Street,
London, S.E.1. Telephone: Hop. 1837.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1072.)

the larger sizes. The connections are very easily arranged.

All that is required is to connect the low-frequency choke across the terminals which at present carry the loud-speaker leads. The loud speaker leads should be disconnected and joined up to new terminals.

One of these new L.S. terminals should be joined to the L.T. negative. The remaining L.S. terminal should be joined to one side of the now fixed condenser. The other side of this new fixed condenser should be joined to the wire which now connects the plate of the last valve to the low-frequency choke.

On switching on you will find that your loud speaker is fed from the set, even although it is in series with the large fixed condenser, and the whole of the plate current of the valve is now passing through the L.F. choke. Do not forget that, owing to the removal of the plate current from its winding, the loud speaker may require readjustment when fitted to the choke circuit.

WAVE-METER WORRIES.

G. C. BLYTHE (Northumberland).—"A friend of mine sent me a home-made wave-meter for a Christmas present, but I think he has made it a bit too strong. When I switch it on, although I cannot hear it by ear, or can only just hear it when listening carefully, it gives rise to a very loud sound in the telephones and is not sharp.

"Instead of only just being able to hear it on the wave-length to which it is set, I can hear it quite strongly about a third of the way down the dial, and very, very strongly at the point where the set comes into tune. It is too strong to be of much use in searching for distant stations because it does not give an exact wave-length, but only an approximation. Is there any way of tuning it down?"

Apparently the whole trouble is due to the fact that you are standing the wave-meter too close to your set. Try taking it out of doors altogether, or placing it a couple of yards or so away from the aerial.

Probably you will find that, if placed thus, the reading obtained will be quite a sharp one; but, if necessary, you can alter the distance from the aerial so that the actual position of the wave-meter is convenient for use and adjustment, and it transmits at a convenient strength into your receiver. When loosely coupled in this way a buzzer wave-meter generally affords a very sharp and satisfactory indication of the wave-length to which the receiver is tuned.

THE LOW-TICKING FRENCHMAN.

A. S. (Greenwich).—"As I am learning to speak French I am interested in these transmissions, and recently I came across a new one which I should like you to identify, if you can. The wave-length is almost exactly that of Goteborg (before the Brussels alteration). After Goteborg had switched off the other night I heard this Frenchman talking, and although I could not catch the words (jamming was bad, as usual, in this part near the river here), I noticed that in the intervals between speech there was a very low ticking clock. As the strength of reception was quite good I should like to listen for this station, if I can find out who it is."

Apparently you heard the new Moroccan station, Radio-Maroc Rabat, which has recently been sending programmes in the evenings on a wave-length of

(Continued on page 1076.)

**MAKE YOUR OWN HIGH-TENSION
ELIMINATOR AND ALL-POWER UNIT.**

RADCROIX

Mains Unit Components.

Guaranteed output 200 volts 30 m/a.

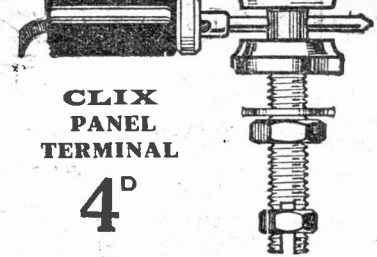
COMPLETE KITS OF PARTS FOR:

H.T., A.O. Unit & 6 Variable Voltages £2 17 8
All-Power A.O. Unit 12 Variable Voltages £3 13 8
D.O. Unit & 6 Variable Voltages £1 8 6
Battery Charger, complete with valves, charging rate 2 amps. £1 15 6
Wiring Diagrams free. State A.O. or D.O.

From your dealer or direct from

THE WHOLESALE WIRELESS COMPANY.
103, Farringdon Road, London, E.C.1.
Telephone: Clerkenwell 5312.

A Better Terminal



Better in many ways. It takes Spade, Pin or bare wire connection quickly and gives perfect contact. Has polished insulated knob with metal inserts. The non-soldering wiring device gives excellent contact and makes assembly easier. Is highly nickel-plated and improves the appearance and performance of any receiver.



PRICE 2d. EACH

Ask your dealer or write for the Clix Catalogue
LECTRO LINK LTD.
254, Vauxhall Bridge Road, S.W.1

"RED DIAMOND" WALL PLUG

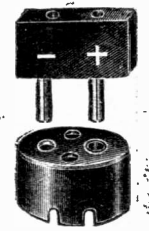
No. RD 29

Solid Ebonite. Highly Finished. Perfect Insulation. Two size plugs and sockets so that it is impossible to insert plugs in reverse. 2/-
Or by insured post 2/3.

Of all high-class Radio Dealers, or Sole Makers:

JEWEL PEN CO., LTD.,

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YES! WE WILL...

SUPPLY YOU WITH ALL COMPONENTS TO MAKE YOUR OWN SET ON

EASY TERMS

EVERYTHING WIRELESS

COMPONENTS FOR ALL "P.W." CIRCUITS

NEW COSMOS MELODY MAKER

MASTER THREE & ETC.

COMPLETE SETS OF ANY MAKE

LOUDSPEAKERS, H.T. UNITS, ETC.

WE CAN SUPPLY

ANYTHING AND EVERYTHING WIRELESS

BEST MONTHLY TERMS

QUOTED BY RETURN

CASH ORDERS PROMPTLY EXECUTED

"P.W." STANDARD LOADING COILS 7/6 ea.

GOODS SENT C.O.D. BY RETURN.

Call at our Showrooms, or post your list of requirements.

The P.D.P. Co., Ltd.,

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PLEASE MENTION "POPULAR WIRELESS" WHEN REPLYING TO ADVERTISEMENTS.

MAKE YOUR OWN CONE SPEAKER

The New Wonder
"Nightingale"

CONE UNIT

Exactly as fitted to our Cabinet Cone Speaker Guaranteed to give results equal to the most expensive Loud-Speakers yet made.

Full constructional details with each Unit.

GRAMOPHONE ATTACHMENT

Reduced from 32/6 to 15/- solely as an advertisement or the famous Bullphone Nightingale Loud-Speakers. Cobalt Magnet guaranteed for all time.

With 4-inch Diaphragm.

Instantly converts your own Gramophone into a full power Loud-speaker, giving a wealth of pure, undistorted volume which must be heard to be believed.



AS FITTED TO OUR £8 POST HORN

BUY ON EASY TERMS

5/- Secures this Speaker

The Nightingale "DE LUXE"

50/-

CASH

or 5/- deposit and 11 monthly payments of 5/-

21 in. high with 14 in. Bell, Mahogany finished with plated arm and stand.

Send Deposit NOW!

Obtainable from your Local Dealer or direct from:—

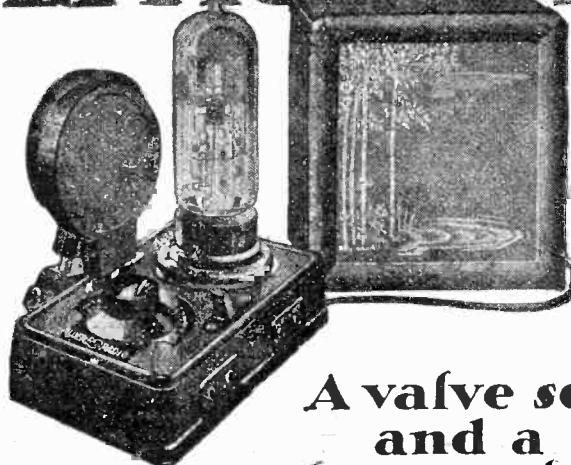
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NIGHTINGALE SPEAKERS

EFFICIENCY



A valve set and a loudspeaker

The 3 in 1 Set

The PIONEER SET of CHEAPER RADIO

The famous Loewe Radio Multiple Valve used contains Three Complete Valve systems in ONE valve, and all the necessary coupling elements of a 3-valve set.

PRICE £3 - 3 - 0

Royalty Paid

(Coils not included)

Complete with Loewe Radio Multiple Valve, type 3 N.F. Special cable with wander Plugs and Spade Terminals attached ready for connecting to H.T. and L.T.

A marvel of ingenuity and efficiency, giving loud-speaker results of excellent volume and purity.

Use a LOEWE RADIO CONE SPEAKER

with your Loewe Set for retaining the full purity of reproduction and a clarity that is unexcelled. Artistic appearance. Silk front. Mahogany finish.

The finest loud-speaker value obtainable at **50/-**

Obtainable through all dealers. For illustrated leaflet write:—

LOEWE RADIO

The Loewe Radio Co., Ltd.,
4, Fountayne Road, Tottenham, London, N.15

Telephones: Tottenham 3911/3912



**Why Worry
about buying a
new Set when
for 12/6 you can
make your present
Set as selective
as the most
modern receiver**

No matter what type of set or aerial you may have, the "HARLIE" WAVE-SELECTOR will definitely cut out the unwanted station, bring in stations—home and foreign—clearer and with greater volume, and also bring in stations hitherto unobtainable.

This ingenious device, which caused a sensation at the Manchester Exhibition, is selling phenomenally and is producing astounding results in all parts of the U.K. Numerous testimonials have been received and these can be seen on request.

4½" high, 3½" diameter. In finest grade black crystalline finish throughout.

NO ALTERATION TO SET—JUST PLUG
AERIAL INTO SOCKET PROVIDED. FULL
PARTICULARS ARE GIVEN.

£100 Guarantee.

If the "Harlie" Wave-Selector proves unsatisfactory, and is returned to us within 7 days of purchase, your money will be returned in full, providing it is purchased direct from us. A similar arrangement can be made with your dealer.

2 MODELS SUPPLIED

- (a) Normal Waveband, 200-700 metres.
 - (b) High Waveband, 700-2,000 metres.
- Please state model required when ordering.

If unobtainable, either model will be sent on receipt of 12/6 or per C.O.D. upon receipt of postcard.

"HARLIE" WAVE-SELECTOR

Dept. C,
HARLIE BROS.,
Balham Road, Lower Edmonton, N.9.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1074.)

414 metres. Although situated in Africa the station announces in French and follows the usual French procedure; Morocco, of course, being under French protection.

AN ALL-WAVE H.F. UNIT.

It is regretted that owing to a shortage of space the article giving further details of the All-Wave H.F. Unit—described in last week's issue of POPULAR WIRELESS—has unavoidably been held over to make room for the important article by the Technical Editor on "Film Talkies by Radio."

Constructors of the All-Wave H.F. Unit and all others interested will, however, find the article in next week's issue of "P.W."

THE SUPER SET.

S. M. G. (Northampton).—"My straight three-valve set has been such a success that this time I am going to construct a super four-valver. What I had in mind was two screened-grid high-frequency valves, detector and pentode, so can you give me a good circuit for these?"

Although we can give you a circuit of this kind, we would very much rather not do so, for when dealing with screened-grid and pentode valves the amplification obtainable is so high, and considerations of layout, circuit and H.T. values become so important that only an experienced set designer could build up such a set from a theoretical diagram with any prospect of successful reproduction.

The fact that you have had several sets up to three valves going well has probably given you sufficient skill and experience to enable you to tackle

A FREE BLUEPRINT

of an outstanding receiver

The "Titan" Three

is being presented to "P.W." readers with

NEXT WEEK'S "P.W."

a straightforward ordinary four-valver with every prospect of success. For instance, if you had a neutralised H.F., detector, and two L.F. (say, resistance-transformer coupled) stages, we should expect you to have no difficulty.

The case is entirely different when screened-grid and pentode valves are introduced. Even with a complete theoretical diagram, with all necessary H.T. values, etc., we expect you would find the greatest difficulty in getting quality reception, and your best plan is to watch POPULAR WIRELESS, "Modern Wireless," and the "Wireless Constructor" for a full description of a set which meets with your requirements as regards range and selectivity; or, if you like to give us further details of the requirements you have in mind, we will recommend a set fulfilling these.

We will, of course, supply a theoretical diagram if you wish it; but, frankly, we would rather not do so, because we are certain that it would cause you more trouble than pleasure in the making.

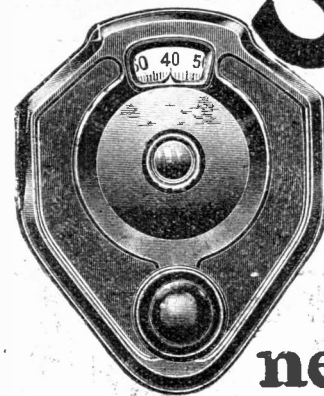
FITTING A FUSE.

D. C. M. (Bristol).—"My chum has had the nasty experience of burning out three valves, so in order to prevent anything of the kind on my set I want to put in a fuse, and I understand that I can use a flashlamp bulb for this. Will a low-consumption flashlamp bulb be quite 'O.K.' and if so where do I insert it?"

A low-consumption flashlamp bulb of the type you mention is quite O.K. to act as a fuse in such circumstances, on account of the fact that it will blow before enough current flows to fuse the valves if the H.T. supply is accidentally shorted across them. It is very easy to add such a fuse, the best place for it being between the H.T. negative and L.T. negative terminals.

If you examine the set you will probably find that these two are joined together by a short, straight wire, and this should be broken and the fuse inserted in series here.

Finished in black or beautifully grained mahogany.



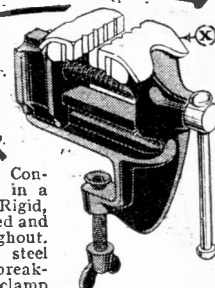
**neat-
accurate and
inexpensive**

Watch for Brownie's latest triumph in artistic moulded Bakelite—"The Dominion Vernier Dial." Special non back lash slow motion drive gives very accurate tuning, while the action will fit any condenser and the new design of the dial will enhance the appearance of every set. See this latest Brownie production at your nearest radio dealer.

BROWNIE
WIRELESS

"DOMINION" VERNIER DIAL
The BROWNIE WIRELESS COMPANY (G.B.) Ltd.
MORNINGTON CRESCENT, LONDON, N.W.1

RAY * VICE
is a capital
Table Vice
WIRELESS WORK



It gives a Wireless Constructor a workshop in a moment—anywhere. Rigid, accurate, finely finished and British Made throughout. Fitted with accurate steel screw, detachable unbreakable jaws. Ample clamp clearance. Jaws: Width 2"; Opening to screw 1½"; clearance to screw 1½". Price 3/9 post free.

Supplied also with detachable White metal Grips, see "x," to hold rods and screws without damage. Price complete with Grips 5/- post free. Cash with Order. Money refunded if not fully satisfied.

Trade enquiries invited.

The STAR FOUNDRY Co., Ltd.
Vice Manufacturers, BILSTON, Staffs.

Direct from the makers.
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EASY PAYMENTS

The first firm to supply Wireless parts on easy payments. Five years advertiser in "Popular Wireless." Thousands of satisfied customers. Send us a list of the parts you require, and the payments that will suit your convenience, and we will send you a definite quotation. Anything wireless. H. W. HOLMES, 29, FOLEY STREET, 'Phone Museum 1414. 29, Portland St., W.1.

WET H.T. BATTERIES

Solve all H.T. Troubles.

SELF-CHARGING, SILENT, ECONOMICAL.

JARS (waxed) 2½" x 1½" sq. 1/3 doz.

ZINCS, new type 1½ doz. SACS 1½ doz.

Sample doz. (18 volts), complete with

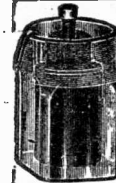
bands and electrolyte, 4/3. post 9d.

Sample unit, 6d. Plus booklet free.

Bargain list free.

AMPLIFIERS 30/- 2-VALVE SET 24/-

P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON



Player's please



REGD NO 151011.

N.C.C. 207

THE 100% Broadcast Receiver

BUILD and OPERATE in
ONE EVENING



"Screened 3 Grid"

Obtain a Broadsheet from your dealer and read why you should—
Completely Screen the Grid

EXTRACT FROM LETTER RECEIVED.

"I have recently assembled one of your Screened Grid Three Wireless Sets, and though I have been a Wireless enthusiast for many years, long before the days of the British Broadcasting Company, and have tried hundreds of different makes of Sets, I have never had such satisfactory results as I obtain from this comparatively inexpensive Set.

"I find the volume and purity remarkable.
All the chief Continental Stations come in at good strength and remarkably clearly."

The above is one of many
UNSOLICITED TESTIMONIALS.

Send post card for FREE FULL-SIZE
LAYOUT PLAN and wiring instructions

THE FORMO CO.,
Crown Works, CRICKLEWOOD LANE, N.W.2

FREE ADVICE

for all our clients
BUY THE EASY WAY, a SMALL FIRST
PAYMENT BRINGS PERFECT RADIO INTO YOUR HOME NOW
Established before broadcasting started in this country, we are able to
give advice that is sound and of inestimable value.

A FEW OF OUR WONDERFUL OFFERS:

CELESTION C.10 loudspeaker, 9/9 now and 9/9 monthly.
BROWN MOVING COIL loudspeaker, 15/6 now and 15/6 monthly.
COSSOR MELODY MAKER KIT, complete with valves in maker's
sealed carton, 13/3 monthly.
DUNHAM A.G. MAINS UNIT, output 150-v. 20 m/a, £5/18/6, or 10/-
now and 10/- monthly.
DUNHAM LONG-RANGE 3 VALVE SET, in handsome cabinet with
compartments for all batteries. LEGAL PROOF given that actually

40 STATIONS ON LOUD SPEAKER

are average results obtained. With Screened Grid, and Pentode Valves. Bat-
teries, Loudspeaker, etc. Cash £21, or 47/6 now and 28/- monthly.
Constructor's Envelope this set, 2/9 only.
DUNHAM DE LUXE ALL-WAVE MULTI-RANGE TWO-VALVE
CABINET SET, for all wavelengths, Hilyersum, etc. NO COILS REQUIRED.
Complete, £9/10/0, or 16/- monthly. Your own set taken in part payment.

Order from your Dealer
if he is a Dunham Agent.

C. S. DUNHAM
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FREE LIST OF CABINETS

FOR ALL THE
POPULAR CIRCUITS
MOVING COIL AND
CONE SPEAKERS

Send this coupon for free copy.



TO CARRINGTON MFG. CO., LTD., CAMCO WORKS,
Sanderstead Rd, South Croydon. Tel.: Croydon 0623 (2 lines).

Please send me full details of the "Moving Coil" and other
Camco Cabinets.

Name

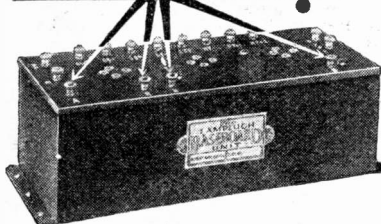
Address

P.W.

This modern method of radio set construction

—overcomes
ALL difficulties!

4 wires from a condenser and a coil, to these **4** terminals—**COMPLETE** a 3-VALVE RECEIVER!



No radio set constructor can afford to disregard the efficiency and simplicity of the Baseboard Unit, which eliminates all the uncertainty of baseboard layout and wiring. Incorporating Valve Sockets, Condensers, Transformers, etc. The whole unit is surrounded by a metal case which acts as a screen.

Prices:

2 Valve Transformer, **37/6**
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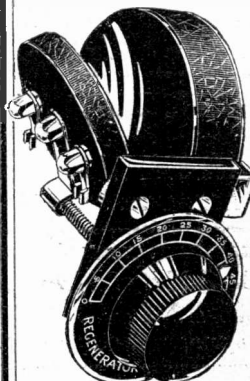
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SHORT-WAVE NOTES.

By W. L. S.

THE past week or so has seen a great improvement in the general conditions for short-wave DX reception from all parts of the world, and it is to be hoped that the abnormally long spell of really bad conditions that we have been experiencing ever since last June or July will be amply compensated for when things get into their stride again.

The outstanding feature of this particular spasm of good conditions has been the great number of signals from Asia, whence they are usually very scarce. Those interested in amateur C.W. reception will doubtless have heard by now VSICB, a British ship at Hong Kong. He comes through night after night at good strength on 41 metres or so, his best time being about 6 p.m. G.M.T.

A Peculiar Phenomenon.

Then there are the little crowd of active stations in the Philippines, another new station, PK4AZ in Sumatra (Dutch East Indies) and XW7EFF off Singapore, the latter being an American boat.

I have heard several faint broadcasting stations on the 20-metre band which I have not been able to identify, but when I get my new set with two stages of screened-grid going, I hope that I shall never have to make this confession again!

An Australian reader is interested in my remarks some time back about a friend who lights an electric lamp in another bedroom (in a remote part of the house) when he switches his 10-watt transmitter on. He asks for full details.

Well, "W. H. C." I am sorry if I misled you, but the phenomenon referred to was an entire accident! My friend was not at all pleased with himself over the business, as, if he wanted to burn the midnight oil over some transmission stunt, he suffered badly from the other phenomenon known as "domestic Q.R.M." owing to the undesirability of having one's bedroom light sending Morse at one when one wants to sleep!

Success of 5 S.W.

The only explanation I can offer is that somewhere or other in the wiring of that particular part of the house circuit was a loop that was resonating at approximately 45 metres. The same gentleman hands a nice bouquet to 5 S.W., which is, he says, a wonderful station, and better than any other S.W. station he has heard.

Another reader calls me to task about my remarks on "W2XAD" as being the correct call-sign for the well-known American. He informs me that they have been calling themselves "W2XAD" for months!

Sorry, but I so seldom listen to him for more than five minutes that I haven't heard him give his 'call-sign' at all for a very long time.

5 S.W. ought, of course, by the terms of the Washington Conference, never to allude to himself as anything but "G5SW." The "G" is part and parcel of the call-sign.



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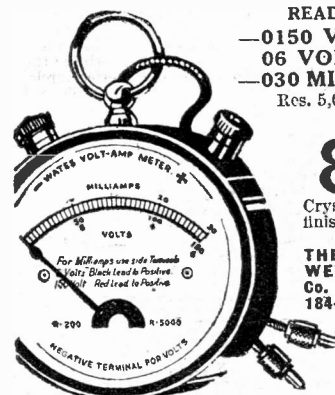
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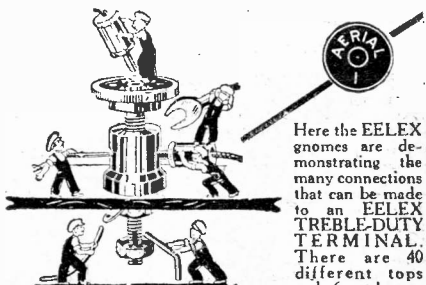
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CUTTING CONES

CRYSTAL RECEPTION—
A "P.W." LOUD SPEAKER.

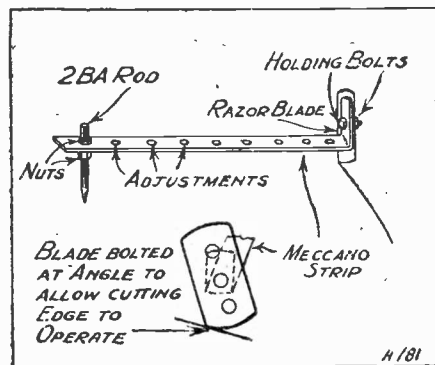
Letters from readers discussing interesting and topical wireless events, or recording unusual experiences, are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

CUTTING CONES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I, being a reader of your paper, have commenced to construct the Loud Speaker No. 3, the "P.W." (Chassis Model). I wish to bring before you, in the hope that you put it before your readers, an idea for cutting the cone.

Take a strip of Meccano and in one end put a piece of 2 B.A. screwed rod, pointed at one end. Fix



this by means of a nut top and bottom. Next bend the other end of strip up and fix a used razor blade, forming a cutting knife. Then adjust the gadget to what size circle you require and, while scribbing the circle, the razor will cut the paper, giving a perfect circle. Trusting you will think this idea suitable for your paper.

Yours truly,
Herne Hill, S.E.24. J. L. GRIFFITHS.

CRYSTAL RECEPTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—It is an amusing fact that, almost invariably, when a reader writes to "P.W." on the above subject he preambles with information to the effect that though the owner of a multi-valve set, he occasionally "plays about" or "messes with" a crystal, to entertain the kids, or kittens, or because his grandmother is afraid of an explosion in a high-tension battery.

May I, therefore, on behalf of less ashamed, or apologetic crystal users, herald the fact that I abandoned the valve for the "humble crystal" six years ago and that "since then" I have never regretted it? I must add that this amazing act is greatly due to "P.W.", which, at the time, published a method of using two crystals as rectifiers. Unfortunately, this method was technically damned in a following issue by a destructive critic. Six years' test has, however, more than vindicated the "P.W." invention. The circuit in which the twin crystals are employed has never been published and never will—because it is too good to appear true.

"GRAND KNIGHT OF THE WHISKER."

A "P.W." LOUD SPEAKER.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am a regular reader of your journal, but do not often write to praise your good work.

However, I have been following particularly your designs lately on home-made loud speakers. I have just made up No. 3 (December 15th) and am really pleased with the results obtained.

I was not able to obtain "Kraft" paper, but used "Bristol Board" instead.

First of all I tried four-sheet, but found it muffled on speech; then I tried the two-sheet and this thickness seems to be perfect for both speech and music, the quality being wonderful as used with Det., 1 R.C. and one transformer-coupled set.

I used the adjustable Blue Spot unit and a sheet of chamois leather for the suspension, the baffle board of 4mm. plywood 15½ in. square, and wooden supports for the unit.

The whole instrument as made up I found to be very sensitive and more than I expected it to be, and I believe it gives louder results than an A.R. 10 Horn, and that is sensitive, as you know.

Thanking you for publishing such good designs.

Yours faithfully,
Bristol. A. N. MARTIN.

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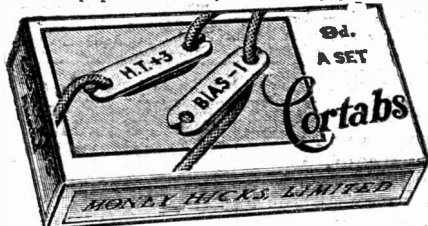


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TECHNICAL NOTES.

(Continued from page 1052.)

aspects of this subject by other contributors have been printed in this paper from time to time.

I would just like to deal in a general way with two or three of the leading points which frequently arise in letters from readers.

Amplification.

The first one, and the one which is most generally raised, relates to the amplification factor. The simplest way to understand what is meant by amplification factor is to imagine a definite change to be made in the voltage applied to the grid of the valve; if an H.T. battery is connected to the anode of the valve and a current is flowing between anode and filament, this change in the potential of the grid will naturally cause a change in the current which is flowing.

But you can look at the matter in another light and you will have no difficulty in agreeing that if the voltage of the grid had remained unchanged, the same alteration in the current flowing through the valve could have been brought about by a suitable alteration in the H.T. voltage applied to the anode.

A Simple Explanation.

Here, then, we have the simplest possible explanation of amplification factor, and we

A Remarkable Receiver

Don't forget your copy of "P.W." next week as this will tell you all about

The "Titan" Three

as well as include a free blueprint of this wonder set.

may say that the amplification depends upon the voltage-change of the grid and the corresponding voltage change of the anode which should have the same effect upon the current flowing through the valve, the amplification factor being the ratio of the latter to the former.

This is sometimes expressed by saying that the amplification of the valve is the number of times by which the changes of the grid voltage are magnified as voltage changes in the anode.

High Factor.

Without any further explanation than the foregoing, you would conclude at once that it was desirable to employ in all cases a valve having as high an amplification factor as possible, since it is primarily the purpose of the valve (with the exception of the detector) to amplify the signals.

This brings us to the point I referred to above, and that is the fact that the characteristics of the valve depend upon other conditions as well.

An Illustration.

If the valve is to handle fairly heavy signals the large voltage amplification may be of little use. Perhaps I could illustrate

(Continued on next page.)



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TECHNICAL NOTES.

(Continued from previous page.)

this in a very rough way (not to be taken too literally) by comparing with an induction coil which, as you know, is commonly used for producing very high potentials.

You might imagine that with electrical current delivered from the induction coil at a voltage of, say, 50,000 volts and passed to any ordinary outside circuit, a tremendous current would flow, proportional to the voltage. The fact is, however, that nothing of the kind occurs in practice, for the very simple reason that the total energy available is limited and the high voltage is only maintained so long as the external circuit has a resistance which is fairly high compared to that of the induction coil itself.

If the "load" applied to the secondary of the induction coil is too heavy, it simply means that the high voltage in question is not generated or, perhaps to express it more correctly, is immediately pulled down to a very much lower value.

Going back now to the question of amplification factor, you will see that the mere fact that the valve has a high amplification factor does not necessarily mean that it will be suitable for the amplification of any particular signals.

Impedance.

For heavy signals it is necessary to have a correspondingly heavy anode current, and this requires that the impedance of the valve shall be reasonably low. Now a low impedance usually means a fairly low amplification factor and we are driven back eventually to a compromise between a high amplification factor and a high impedance on the one hand and a low amplification factor and low impedance on the other hand. Our object must be to choose a valve which has as high an amplification factor as possible, consistent, however, with as low an impedance as can be obtained.

For resistance-capacity coupling it is particularly desirable to have high amplification and fairly low impedance, since with this method of coupling the voltage step-up which is obtained with transformer coupling is not available.

An Acid Test.

I was recently asked by a reader why rubber carrying-handles are sometimes used for accumulators rather than leather. The answer is a very simple one—that the carrying handle is almost certain to be contaminated with acid sooner or later, and in the case of a leather handle this is apt to lead to rotting, with the obvious possibility of trouble sooner or later with the accumulator being dropped upon the carpet. A rubber handle is practically proof against this kind of trouble. Usually, in order to give added strength, the so-called rubber handle consists of several layers of fabric covered in vulcanised rubber after the fashion of a motor tyre.

Personally, I think that a metal or wooden handle is, in any case, preferable to either of the above-mentioned.

Corrosion.

Corrosion of accumulator terminals, once it starts, is often very difficult to cure. If a battery is left unattended for a long period you will sometimes find that one of the

(Continued on next page.)

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TECHNICAL NOTES (Continued from previous page.)

terminals will be completely corroded, and instead of a metal terminal you will find a nice little mound of pale green powder.

If matters have gone so far as this there is nothing but to remove the remains of the corroded terminal and to screw in or sweat in a fresh terminal. The latter, by the way, is rather a ticklish job requiring a certain amount of experience in lead soldering, and if the damage is considerable and the accumulator a valuable one, it is better to return the battery to the manufacturers for repair.

Prevention and Cure.

Prevention in this matter is very much better than cure and, in addition to keeping the exposed metal parts covered with a thin layer of vaseline, you should keep a look-out for the start of corrosion and correct it immediately by applying a little of a strong solution of washing soda or ammonia. (This may conveniently be done by means of a very small brush.)

Output Filters.

Should a choke filter be included in the output of a set? This is a question which, though often asked, depends (like so many other radio questions) largely upon circumstances. The output filter has the effect of allowing the signal impulses which corre-

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spond to the speech or music to pass to the loud speaker by way of a condenser which keeps out all else.

Now if we are using only a small power valve in the last stage it is, as a rule, fairly safe to connect this directly in circuit with the loud speaker, since the latter will generally be proof against any possible damage by the current from the small power valve.

"Super Power."

If, however, the set is one which delivers such a signal volume that the "small power" valve referred to above has to be replaced by a valve of the super-power variety, it becomes an important question whether an output filter should not be used, and this on account not only of the heavier current but also of the actual mechanical (magneto-mechanical) effects produced in the loud-speaker unit.

L.F. Oscillation.

If the heavy anode currents are passed through the low-resistance windings of a suitable filter-choke, then, as I have already mentioned, only the signal impulses reach the loud speaker.

The separation of the steady anode current from the signal impulses by means of the choke filter circuit often has the effect of stabilising a set which is otherwise liable to troublesome low-frequency oscillation.

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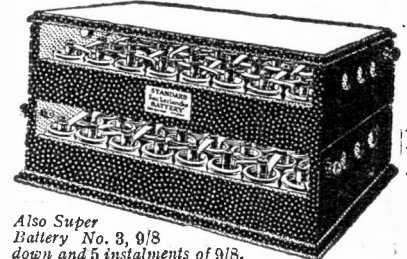
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THIS week's design is for a mains H.T. unit of a particularly well-smoothed type. It works from A.C. mains (of any voltage, provided the correct transformer is obtained) and the filtering arrangements are so thorough that the output is practically indistinguishable from that of a good

new battery. The circuit is practically a standard arrangement so far as the rectifying portion is concerned. A power transformer of the usual type is required, having two secondary windings, both centre tapped. One of these is a low-tension winding which lights the filament of the special rectifier valve, the actual voltage output required depending upon the particular type of valve used.

For example, for the Marconi or Osram U.5 rectifier a winding of a 5 to 6-volt rating is required, to supply about 1½ amps. The other main class of rectifier is the 4-volt one, examples being the Mullard D.U.2 and the Cosmos S.P.42 U., and here you want a winding supplying a current of about 2 amps. at 4 volts (Cosmos) or 1 amp. at 4 volts (Mullard). Whatever make or type of valve you choose note that it must be of the full-wave variety.

The high voltage secondary supplies the actual H.T. current, and the voltage here fixes the maximum output voltage of the completed unit. This, of course, depends on your own particular requirements, and requires a little consideration before you order your transformer.

Choosing Your Transformer.

For general purposes with ordinary valves an output voltage (maximum) of 140 to 160 volts is ample, and to get this you want a transformer with a high-tension secondary giving 150 volts on either side of the centre tap. This is usually described as a "150-0-150" volt winding. For larger power work, where your last valve will stand a high voltage a transformer rated at 250-0-250 volts for the H.T. winding should be chosen. In any case, be careful to specify the voltage and frequency of your mains when ordering.

Just a word of explanation of this part of the circuit diagram. You will see that the rectifier valve has two plates, and in the middle a dotted line to represent the filament, with a connection to the low voltage winding on the transformer from each end. The two plates are wired to the extreme ends of the high voltage winding.

The actual connections of the valve base are these: the filament is wired to the usual filament pins, while the two plates are connected to the plate and grid pins. The centre tap on the L.T. winding of the transformer forms the positive

THE "P.W." "WHITE PRINTS."

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pole of the circuit, and the centre tap on the H.T. winding the negative.

Leads are taken from these two points to the smoothing filter circuit, which you will see is an unusually thorough one. It consists of two smoothing chokes in series and several large capacity reservoir condensers. By the way, don't make the mistake of using ordinary low-voltage Mansbridge condensers here. They must be of the high-voltage type, with a rated working voltage of at least 250 volts.

After leaving the filter circuit the rectified and smoothed current, which is now practically pure D.C., is applied across the

voltage terminal giving the full maximum voltage of the unit, and is intended for supplying the L.F. valve or valves.

The other two terminals (H.T.+1 and H.T.+2) are variable as to voltage in steps. You will note that each is wired inside the unit to a flex lead carrying a wander plug, and by placing these plugs in suitable sockets on the potential divider you can get the desired voltage regulation. For example, if the maximum voltage of your unit is about 200-220 volts the plug for the H.F. valve should be put in a socket near the middle of the divider, and will then give the necessary 100-120 volts for this stage. The one for the detector should go in a socket somewhere between this point, and the negative end (nearest to H.T.—) the exact best point being determined in the usual way (smoothest reaction).

COMPONENTS.

- 1 Panel, 8 in. × 7 in. × $\frac{3}{16}$ in. or $\frac{1}{4}$ in.
- 1 Cabinet, with baseboard 14 in. deep.
- 1 Power transformer rated to suit your mains (A.C.) and with centre-tapped H.T. and L.T. windings (see text).
- 1 Valve socket.
- 2 L.F. smoothing chokes of good make.
- 4 2-mfd. reservoir condensers, minimum rating 250 working volts.
- 1 8-mfd. ditto.
- 1 Potential divider (see text).
- 4 Insulated terminals.
- 2 Battery plugs, wire, flex and adapter for connection to mains, screws, etc.

ends of a device known as a "potential divider." This is simply a large and robust tapped resistance of a special type made for eliminator work which is connected up potentiometer fashion, with its two ends right across the circuit. Intermediate voltages can thus be tapped off it at various points as desired for the different valves in the set.

A suitable resistance for this component is 15,000 to 25,000 ohms, and quite a number of different makes are available. In the one illustrated a row of sockets along the top represents the various voltage tappings,

Preventing Motor-Boating.

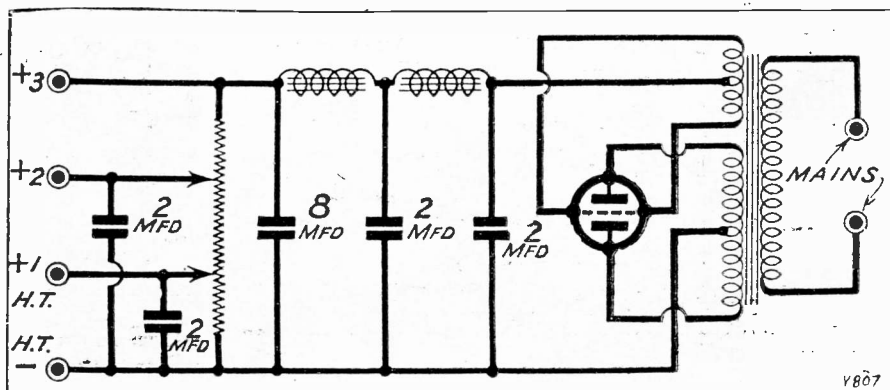
Across each of these variable voltage terminals an additional 2 mfd. condenser is shunted to H.T.—, and these are most important, since their function is to prevent motor-boating and other back-coupling troubles.

The constructional work is extremely simple, and only one point need be mentioned: on no account forget that it is important to use well-insulated material for the wiring. Stiff wire and Systoflex sleeving make a good safe job and is advised.

Now for some miscellaneous "safety" hints. First of all, about the connection to the mains. This will be in the form of a flex lead bearing an adapter or plug, and you should take care to avoid leaving any "whiskers" at either end which might stray across and produce a short by touching.

Next, be very careful never on any account to do anything inside the unit while the mains are switched on. Always switch off first, and so make sure that you cannot receive a shock. This is most important, since there are very high voltages across various points inside any A.C. type of unit.

Always be careful to switch off at the mains before doing anything whatever inside the set. Fairly high voltages are to be found at various points here also, especially if the L.T. happens to be turned off. Quite nasty shocks can be received if you forget this. The power available is considerably greater than when average sized batteries are used.



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