

FEATURED THIS WEEK: **WIRELESS IN WAR-TIME—EXCITING DIARY EXTRACTS**

# Popular Wireless

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PRICE  
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No. 516. Vol. XXI.

INCORPORATING "WIRELESS"

April 23rd, 1932.

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SHORT WAVES, MEDIUM WAVES, LONG WAVES  
—THREE WAVE-RANGES & NO COIL CHANGES.  
THE PERFECT TWO-VALVER FOR LOCAL OR  
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**ALL IN ONE**  
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stethoscope is to the doctor. Saves its first cost over and over again. Patented throughout the world, there is no other instrument like it. Simple to use and efficient.

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Connected in One  
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Effectively Screened

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CASH OR C.O.D. POST FREE  
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**The only Unit that adds needle-point selectivity  
without decreasing Signal strength!**

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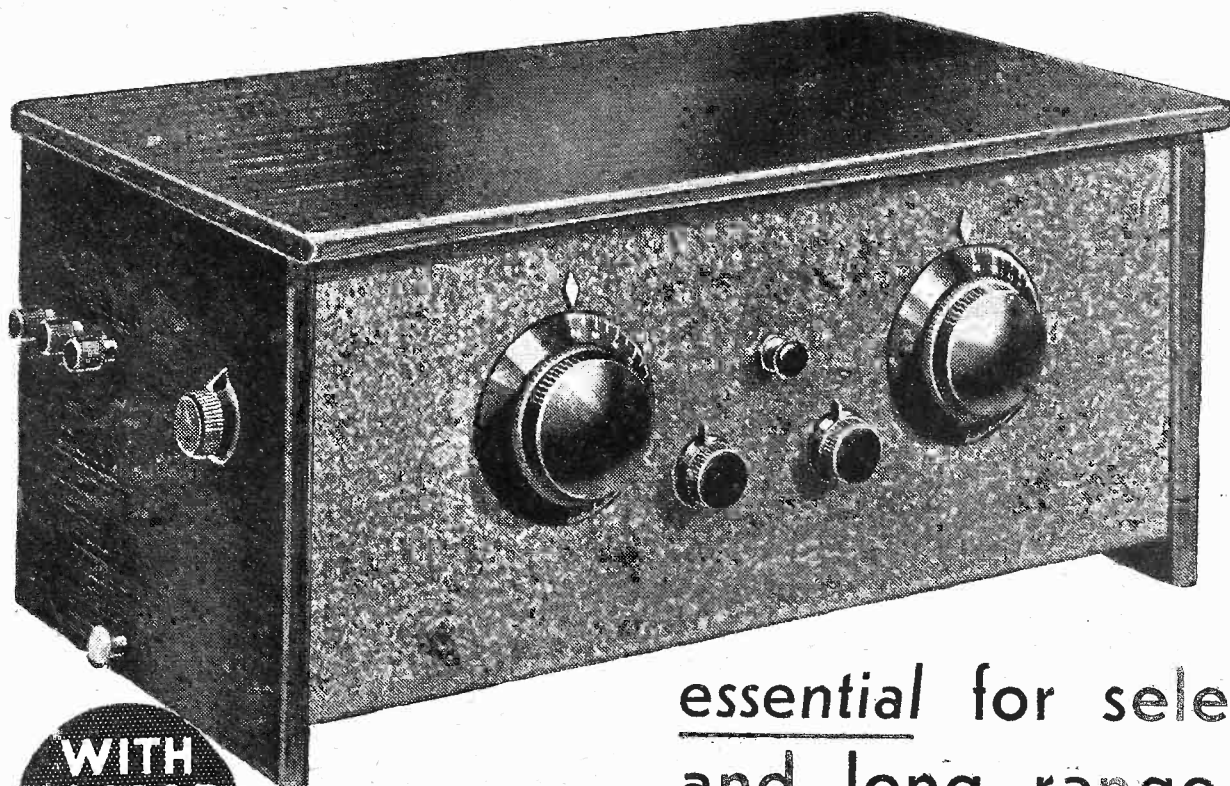
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P.W. 23/4/32

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COSSOR  
VALVES**

essential for selectivity  
and long range . . . .

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For as little as £6.8.6 you can own an up-to-date Screened Grid Receiver—the Coscor Empire Melody Maker Model 234 (All Electric Model 235, £9.9.6). In spite of its exceptional efficiency—its range—its selectivity—its rich, full-toned volume the Coscor Empire Melody Maker is so simple that you can easily assemble it at home. Fill in the coupon and get full particulars.

To A. C. Coscor Ltd.,  
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Please send me free of charge  
Full - Size Constructional  
Chart which tells me how to  
assemble the Coscor . . . .  
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## **BATTERY MODEL 234**

**KIT OF PARTS** complete, including latest types of Coscor Metallised Screened Grid, Detector and Power Valves, hand-some oak cabinet and every component necessary for home assembly of the complete Receiver as illustrated.

Price **£6:8:6**

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(For A.C. Mains)

**KIT OF PARTS** complete including handsome oak cabinet, Coscor Metallised Mains Screened Grid and Detector, Power and Rectifier Valves, Heavy-Duty Mains Transformer and every component necessary for home assembly of the complete Receiver. Price

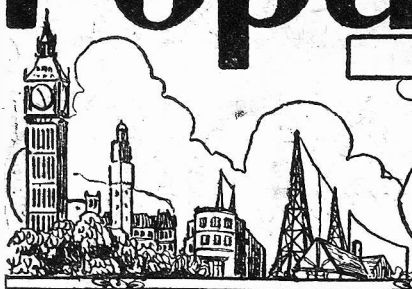
**£9:9:6**

Hire Purchase Terms: 20/- deposit and 9 monthly payments of 21/-

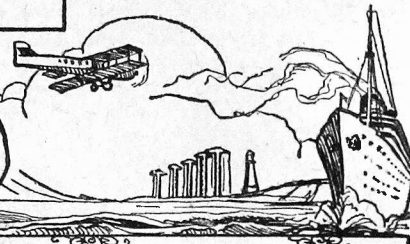


# Popular Wireless

## LARGEST NET SALES



Scientific Adviser:  
Sir OLIVER LODGE, F.R.S.  
Chief Radio Consultant:  
CAPT. P. P. ECKERSLEY, M.I.E.E.  
Editor: NORMAN EDWARDS.  
Technical Editor: G. V. DOWDING, Associate I.E.E.  
Assistant Technical Editors:  
K. D. ROGERS, P. R. BIRD,  
A. JOHNSON RANDALL.



**SHORT-WAVE NEWS**  
**HOTEL RADIO**  
**OLD AERIAL REVIVED**  
**NEW TYPE VALVE**

## RADIO NOTES & NEWS

**THE NEW DANCE BAND**  
**HISTORY OF A CLUB**  
**MORSE, R.A.**  
**WIRING UP**

### The Colour's the Thing.

SO far as I have heard up to the present, the outstanding feature of this year's Radio Exhibition at Olympia—apart from the fact that the exhibition is to be held in the middle of the summer holidays—is its colour scheme of royal blue and silver. This scheme replaces that, which for the last eight years has been royal blue and gold: so you can see that no mental effort to make the show a success has been spared. However, to drop this chaffing, I may say that the main design of the Grand Hall layout, as conceived by the R.M.A., is a striking and attractive variation of former arrangements.

### Air Ministry's Appeal.

THIS is nothing to do with radio, but is in the public interest. The Air Ministry appeals to the public not to disturb more than may be necessary the remains of damaged aircraft. Further, if pieces of the aircraft are found at a distance from the scene of the crash, the fact should be reported at once to the police. Interference with wreckage is illegal and, in any instance, the smallest part of a wrecked plane might be essential to the discovery of the cause of the accident.

### Short-wave News.

IN a paper read last month by Mr. T. L. Eckersley, B.A., B.Sc., before the Institution of Electrical Engineers, it was disclosed that deductions from the behaviour of short waves over long distances, when used in the Marconi facsimile method of transmitting pictures by radio, showed that waves of 15 to 50 metres normally pierce the Kennelly-Heaviside Layer at a height of 100 kilometres, and are reflected by the Appleton Layer, which is electrically

denser, at a height of 300 kilometres. By the way, it was stated also, that as the maximum density of the Appleton Layer is half as great again now as it was in 1928, the ultra-violet light from the sun is less intense now. What sun? Where?

### Wonderful Hotel Radio Supply.

THE new Waldorf-Astoria Hotel in New York is equipped for the delivery of six different programmes to each of its 1940 private rooms and many of its public rooms. Some of these programmes may be radio broadcasts picked up by the

the end of last year, and in future broadcasting in New Zealand will be controlled by an independent Board constituted on the lines of the B.B.C. I think that Canada will be the next to come into line.

### Old Type of Aerial Revived.

J. F. writes from Manitoba to tell us about a type of aerial which is popular in those parts; this turns out to be our old friend of the "umbrella" type. One pole, on the roof, with an insulator at its free end, from which three legs of wire go to insulators on other parts of the roof, like the ribs and stick of a partly opened gamp. This is a useful type, but its novelty has lost its youthful appearance. Incidentally, J.F. says that the usual kind of aerial, which consists of a single wire strung horizontally, is not so good because of its "directional" effect: but I understand that this effect is so small as to be negligible, unless the length of the horizontal portion is great compared with that of the down lead.

### New Type of Valve.

THERE seems to be no end to the possibilities of vacuum tubes.

At a recent meeting of the American Physical Society representatives of the General Electric Company of New York announced the invention of a valve said to be 1,000 times more sensitive than its predecessors in the measurement of minute voltages. This valve, with an exhaustion of one billionth of atmospheric pressure can detect voltages of one ten-millionth of one volt—which is a voltage of the order of magnitude of that which is produced by a heart beat, for the detection and recording of which a portable electro-cardiograph can now be supplied.

(Continued on next page.)

## RADIO IN THE GERMAN PRESIDENTIAL ELECTION



Radio's importance in politics seems continually to increase, and it certainly played a large part in the election of the President of the German Republic. Here is one of Berlin's giant public-address vans which urged the people to vote for Hindenburg.

hotel's aerals, and others may be tuned-in from various public rooms in which interesting events are happening or bands playing. In addition, the hotel has a permanent sound picture system for the grand ball-room, and a portable one for use in the smaller public rooms.

### New Zealand Changes Over.

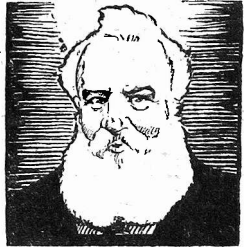
THE Radio Broadcasting Company, New Zealand, has been awarded by an arbitrator the sum of £58,646 in respect of its four stations which have been taken over by the New Zealand Government. The Company's licence expired at



# NEWS—VIEWS—AND INTERVIEWS (Continued)

## Bell, the Wizard of Sound.

**A**NOTHER "American" inventor, Alexander Graham Bell, who was born in Scotland and educated there and in London, spoke some ten or eleven years ago by radio-telephony from London to the League of Nations at Geneva. I had the honour to be a sort of M.C. on that occasion.



Bell asked me to write out a suitable speech for him, which I did, by dint of intensive brain-work, there and then. He took it, thanked me effusively, and then shoved my masterpiece into his trousers pocket and gave a speech "off his own bat."

I recollect that he refused coffee and cigars, though the ground was snow-covered and the hour early—Christmas or Boxing Day, I believe.

## Henry Hall and the New Dance Band.

**I** MEAN orchestra, of course! Well, I think that Henry will weather the storm and ride on an even keel (row). I do not think, though, that ladies will send him flowers, birthday cards, etc., for his vocal microphone appeal is not so winning as that of the breathless Jack Payne. It's the human touch that "gets over," Henry. As to the orchestra, whilst it seems to me to be lighter and less decisive in voice than the dear departed, I think that it has a distinct personality which will gradually please the public. It lacks the volume of J. P. & Co., but certainly has a "sweetness and light" touch which a dance orchestra should possess. I wish, however, that Henry would do without a vocalist; the B.B.C. already has too many!

## Insult Added to Injury.

**I** HEARD, not long ago, of a fellow who smoked hard for two years, adding coupon to coupon, and at last exchanged the coupons for a radio set. It was not a very good set and seemed to have been made by a draper. It was distinguished by a dignified silence. Now, while its owner was in the course of trying to make it function, he was "pinched"



for not having a licence. If you know of a harder bit of luck than that, let's hear about it!

## Interval for Refreshments.

**I**T is pleasant to pick up a letter from Plymouth, writ by one, F. W. Last year I paid a flying visit to the Hoe, via the prison—and it "thundered and light-ninged" so much that I fled to tea and toast down a side street. I propose to tramp Dartmoor this year, in revenge.

F. W. makes W. L. S. and myself blush with his kind remarks, and the Editorial fellers positively propose to form a Union to demand (on the strength of his praises), more tea per pot per person.

My dear F. W., letters like yours reconcile us to our fate to work in Tallis Street while less worthy men breathe the placid air of Dartmoor—and get their porridge free!

## Brief History of a Club.

**T**HE formation of a short-wave club for Coventry and District, which I announced at Christmas time, excited a very gratifying amount of interest, and about twenty people attended the first meeting, one even cycling ten miles to be present. (No Laodicean, he!) Everything seemed to be going as merrily as an electron in a "space charge" when difficulty arose in regard to a club-room; meanwhile, the winter was passing, or so the almanac said, and the waiting members began to diminish in number. So now it looks as though the attempt must be written off as a mis-fire,

## "SHORT WAVES"

### HEAR, HEAR?

By a new microphone, the closing of an eyelid can be made audible.  
Forte winks.—"Sunday Pictorial."

It is stated that the B.B.C. has a new saxophonist standing 6 feet 7 inches, and weighing over 17 stones.  
We are not intimidated.—"Punch."

Owners of valve receivers often deplore the life of the batteries. They should always purchase them as far away from where they live as possible. This will ensure them "going a long way."

Johnny (proudly): "You know, Granny, Marconi invented the wireless."  
Granny: "Oh, Johnny dear; you know you ought to say Mrs. Coni."

"Soon they will be trying to form a 'to bed' committee in an effort to make the public go to bed at a set hour every night."—A Brighton Vicar.

That will at least be a change. At present we can't go to bed because of the wireless set next door.—"Pictorial Weekly."

### DISILLUSION!

What's on? Talk on "Hygiene"? How bright!  
Then an "Orchestral Concert" (termed "light"),  
And a "French Talk" to swallow,  
"Shipping Forecast" will follow—  
Oh! Good-night, everybody! GOOD-night!

and the project postponed till next winter. Well, call on "P.W." again when you are ready, boys.

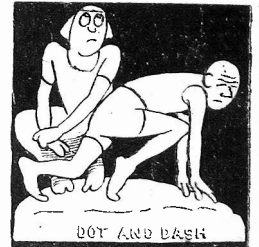
## Television Note.

**T**HE Editor of the *Scientific American*, a magazine of high repute all over the world, says in its April issue: "... it must be remembered that television is as yet a new art, and that it involves factors on which there has never been accumulated sufficient knowledge to make rapid progress possible. Television is here and has been here for some time—but only in the laboratory stage." I am sorry to see it reported that the Federal Radio Commission has refused a licence to an American station which wished to use the Baird television system, though this, I

should add, is not an adverse reflection on that system, but the result of a fear that the licences would in some way give a foreign firm too big a standing.

## Morse, R.A.

**D**ID you know that Professor Samuel F. B. Morse, inventor of the telegraph code which bears his name, was trained for and intended to be an artist, a painter and sculptor? He came here to study art in 1811, and actually gained a gold medal in 1813 for a statue. Then he thought of *dah-de-dah* and no more was heard of his art.



On February 11th, however, an exhibition of his paintings was unveiled at the Metropolitan Museum of Art, New York City. Mal-treating the classic slogan, I may say, "Art is long but telegraphy is quicker!"

## The Performing Milliammeter.

**T**HE technical squad have passed me a letter from J. A. (Birmingham). This comrade acquired a milliammeter—price not stated—and experimented, with various (alleged) known resistances, on his H.T. battery. His table of readings are fit to make Mr. Ohm turn in his narrow cell.

I sorrow with him. In China, years ago, I had a voltmeter which registered a consistent 2.3 volts on all fully-charged accumulators on weekdays, but which said 1.7 on Sundays. Moreover, when it said that a charged accumulator, *on charge*, registered 3.6 volts I knew we should have a typhoon in 24 hours! The moral, is, accurate standards and measuring instruments are darned expensive.

## Wiring Tip.

**A** USEFUL hint, but one which I hope you will never take, comes from America, where an electrician overcame a cable-laying trouble in a novel way. He required to pass the cable across a house, between the roof and ceiling, but the available space was too small for him to take it through himself. So he procured a cat and tied a long piece of string to its tail. (Even *that* wants doing! You just try it!)



He then inserted the cat into the hole, which he blocked up sufficiently to prevent the animal from "backing out" of the job. All he had to do after that was to wait at the opposite hole till the cat emerged, when he untied the string and fastened his cable to it, so that he could pull it through from the other side. What a brain!

ARIEL.



# THESE RADIO COMPONENTS

# A COMPLETE AND CRITICAL REVIEW

by  
Capt. P. P. Eckersley  
M.I.E.E.

I BEGIN my first article on components, by dealing with tuners and coils.

The basic requirements of a good tuner and/or high-frequency circuit is that the circuits shall respond relatively very strongly over a band of frequencies of width about 8,000 cycles and relatively very weakly to *all* other frequencies. But the band-width of response must be variable, otherwise stations will come in together, particularly when one, contiguous to another in the wave-length plan, is comparable in strength to the one one wants to select. Thanks to the inaction of the Union Internationale de Radiodiffusion and to the high power of stations, what we call selectivity is a paramount consideration.

## The Ideal Solution.

Now, the ideal arrangement of circuit is to use, say, twenty coils, each in cascade and each coupled to the other. But the ideal solution is impractical. The Americans, with their cheaper valves and mass production, come nearer to the ideal design than anyone. But the British manufacturer is penalised.

In practice, and where, as in Britain, the price of valves is relatively high, we have to use only a few stages of high-frequency tuned circuits, and the design of the coil becomes very important. It must have, however, whether connected as band-pass, or peak-tune, a low value of resistance for a given value of inductance. So we come to coil design.

From what has been said above we see that we judge a coil for a practical set in terms of the lowness of the ratio of its resistance to inductance or, more scientifically, its R over L ratio.

But coils frequently have to be screened or they couple to one another and produce unwanted and uncontrollable retroactive effects.

## The Eckersley Tuner.

If coils did not have to be screened or, more clearly, in designs where coils need not be screened, the R over L ratio is largely determined by the actual physical size of the coils.

In the Eckersley Tuner the coils were purposely made big. They had a lower R over L ratio than any coils ever put on the component market. The Eckersley Tuner

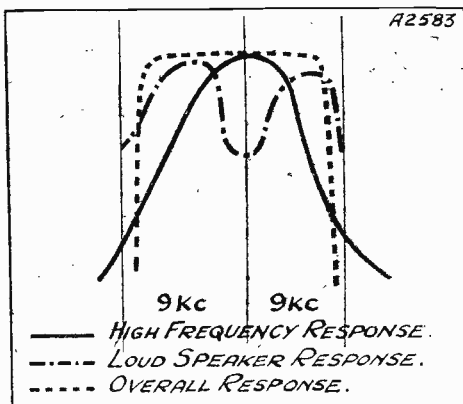
## 1. COILS AND TUNERS.

This week our Radio Consultant-in-Chief really gets to work in his analysis and criticism of modern radio components. Logically he starts with coils, for these are found at the "front doors" of all sets. In later articles he will deal with the various other sections of a set, and the parts used in them.

is, in consequence, far more selective than any other similar device. It appears as if this component has not been properly understood. It was designed for an inexpensive set.

That the unit was in itself more expensive than other units is true, but other units have to be used with high-frequency

## "A PERFECT COMBINATION"



Capt. Eckersley suggests that the peak tuning given by ordinary coil and condenser arrangements is "the thing for modern needs," as it tends to "correct" the response of the average modern loudspeaker or, if you prefer it, vice-versa. You see by the "dash dot" curve that a loudspeaker deals less efficiently with the low notes and that these represent just that part of the "audio" range of frequencies which "peak tuning" emphasises.

valves and they are not so selective and the price of the whole set, using such other coil units, is frequently greater than the Eckersley set.

One point more while I am still on the Eckersley Tuner. My correspondence shows that the sole criticism of the device

was that it was insensitive. All detector and two-note mag. sets are insensitive, and depend wholly for their sensitivity upon the use of big aerials. If you can get a big aerial I will guarantee you more *separate* foreign stations than any other set at the same price.

## Screened Inductances.

When coils are screened they have to be smaller and the criterion of size no longer exists. The R term—the resistance of a coil, in fact—is influenced by screening. A big coil spreads out its field, and this sets up wasteful eddy currents in local screening boxes or canisters. Small screened coils, therefore, can be quite efficient.

Some manufacturers publish curves of the so-called dynamic impedance of their coils when tuned by a suitable condenser. I should feel happy when purchasing a coil the performance of which is published. You should get dynamic impedances (provided no retroaction is employed) of about 100,000 ohms at the shorter, down to 10,000 at the longer medium waves. Any coil giving this kind of performance is to be recommended.

## Coil Construction.

It is terribly important to look into mechanical construction, particularly if you are to use ganged condenser tuning. If wire stretches or the former warps the inductance must change, and this will throw out all the tuning and make selectivity a farce. I have seen coils which would not last a few weeks, others are carefully held together, and should stay put for ever. Shoddy ebonite—muckite, in true fact, will soon warp. Paçolin is good stuff, so is good-grade ebonite.

## Band-Pass Units.

Thus, if a coil is not shielded its efficiency increases with its size, its permanence with material used and care in construction.

Some of these band-pass units are a snare and a delusion. A reliable friend told me he had measured up one or two and found not only the primary intended response, but one fifty kilocycles away from that response as well!

To my mind "band-pass" is a much-abused term. It usually means an asym-

(Continued on next page.)



## OUR LISBON PROGRAMME

Some extracts from the thousands of postcards and letters received from readers. The original "Cosmic" Record was carefully preserved for the writer of what we considered to be the best commentary on the historic broadcast, and details of the award are given below.

" . . . The reception was at times brilliantly clear, and I think POPULAR WIRELESS will receive the sincere thanks of numerous short-wave fans. Is it not possible to arrange other 'P.W.' broadcasts . . . ?"—G. B. C. (Normanton, Yorkshire).

" 'P.W.' scores again! CTIAA provided excellent 'meat.' . . . Subject original. Whole programme enjoyed. More, please . . . !"—T. A. W. (Roundhay, Leeds).

### That Personal Touch.

" . . . I felt that the broadcast provided the hitherto impossible personal contact between Editor and reader. Although providing excellent entertainment, it was of scientific and international importance . . ."—E. A. C. (Pear Tree, Derby).

" . . . Fine, isn't it, the way POPULAR WIRELESS looks after its readers? . . . Makes us feel like one of a big family . . . !"—W. T. (Trafford Park, Manchester).

" . . . It was the best that could have been crowded into any two hours . . ."—I. M. (Glasgow, C.3).

" . . . I think that you and Captain Eckersley should have visits to some more Continental stations. . . . Many thanks for the excellent broadcast. I had previously thought my set to be a dud round 42.9 metres . . ."—J. B. M. (Killoch Drive, Glasgow).

" . . . 'P.W.' was right again. I've read it since 1926, and it's always right. . . . Thanks, 'P.W.' . . ."—B. W. M. (Hythe, Kent).

" . . . What a thrill to hear C T I A A giving a special transmission for all 'P.W.' readers! . . . Who would not be a reader of such excellent radio papers when they provide the most up-to-date ideas for their readers, a world-wide set, and a special world-wide transmission to try it out on . . . ?"—G. C. (Birkenhead).

" . . . I write to thank all concerned in the enjoyable broadcast from Lisbon . . ."—W. J. L. (Ouslebury, near Winchester).

### "A Splendid Plan."

" . . . I thought the broadcast such a splendid plan. Congrats., 'P.W.' from a woman . . . !"—Miss M. L. M. (Penrith, Cumberland).

" . . . The two hours' broadcast from Lisbon was the best I have ever spent among the short waves, and may we have a few more like that one . . ."—C. N. (Stourbridge, Worcester).

" . . . I wish to write congratulating you on the decision to give an address in Esperanto near the beginning. How much simpler foreign listening will become when the use of Esperanto by the announcers is

more widespread . . ."—A. G. B. (Ashford, Kent).

" . . . Thanks are due to 'P.W.' . . . it gave us an opportunity of hearing Captain Eckersley on the air again . . . the latter might well have been in the studio in person instead of on a gramophone record . . ."—G. C. A. (South Bermondsey).

" . . . May I congratulate you on your special programme from Lisbon? Last night reception was very good, excellent loudspeaker strength being obtained. The talks by Mr. Kelsey, Captain Eckersley, and Dr. Penha Garcia were splendid, every word being distinct. . . . Best wishes to 'P.W.' . . ."—C. J. B. (Plymouth, Devon).

" . . . Good luck and thanks for your pioneer work . . ."—G. S. (Southampton).

### "Big Ben and the Soap Box."

" . . . Hearty congratulations on your excellent broadcast. P. P. E.'s speech was great, especially his amusing remarks about Big Ben and the soap box. 'P.W.'s' idea of a special programme will do quite a lot to popularise short-wave reception, especially if the dose is repeated at short intervals . . ."—J. W. H. (Gloucester).

" . . . Congrats., 'P.W.!' Real live-wire radio! Your broadcast received here perfectly. . . . 'Cosmic' is my next set . . . !"—W. A. A. (Anfield, Liverpool).

## A BEAUTIFUL BROADCASTER



Lady Wilkins, wife of the famous broadcaster, who was well-known on the stage as Suzanne Bennett, broadcasting from a New York station.

" . . . This Lisbon idea is the absolute limit, surely even 'P.W.' cannot find a better and brighter one. During its career it has 'popped' up with some marvellous things, but to bring the wonderful 'Cosmic' into being and then confidently provide us with a special programme umpteen miles away! Who said the sky's the limit . . . ?"—T. O. S. (Bolton, Lancs).

"On taking up S.W. reception in 1923 I was greatly impressed by the spirit of comradeship existing between amateur transmitters of various countries. I thought then as now—'If Peace Conference delegates were selected from S.W. amateurs, World Peace would be assured.'

Lisbon's 'P.W.' 'Cosmic Overture Seals More International Comradships.'"

Yours faithfully,

H. RIDDLE.

North Street, Wilton, Wilts.

And, after careful consideration, we have decided to award the prize to Mr. Riddle, not so much on account of his clever play on the letters of the word "Cosmic" as for the sentiment he so aptly expresses in his entry. The original "Cosmic" record will be sent to Mr. Riddle in due course, and we feel sure readers will join with us in congratulating him.

## THESE RADIO COMPONENTS

(Continued from previous page.)

metric response, too wide for modern conditions, and requiring an accuracy and skill in adjustment outside the powers of most people who operate the set.

The theoretical value of band-pass is that you get more upper frequencies and a flatter response.

Few people realise that the loudspeaker response is such as to compensate for the theoretical bad qualities of peak tuning. Look at my diagram. Here is a peaky response high-frequency curve against a typical loudspeaker response. The combination is perfect!

### Peak Tuning Better.

Again, the peak tuning device, particularly where reaction is used, has the profound merit of increasing the intensivity of the local or wanted carrier. This, in turn, gives a much better detector efficiency and, in creating strong demodulation effects, gives an enhanced selectivity provided the low-frequency response cuts off quickly above 6,000 or so. And in modern conditions this must be done.

The band-pass so called may even reduce carrier-wave strength and give too little bass to a loudspeaker already deficient in that quality. No, peak tuning is the thing for modern needs, and I repeat, if you want a cheap set and if you can use a decent-sized aerial, the Eckersley Tuner is the best of all coil units. I say it unashamedly because from calculation and personal tests I know it to be the thing.

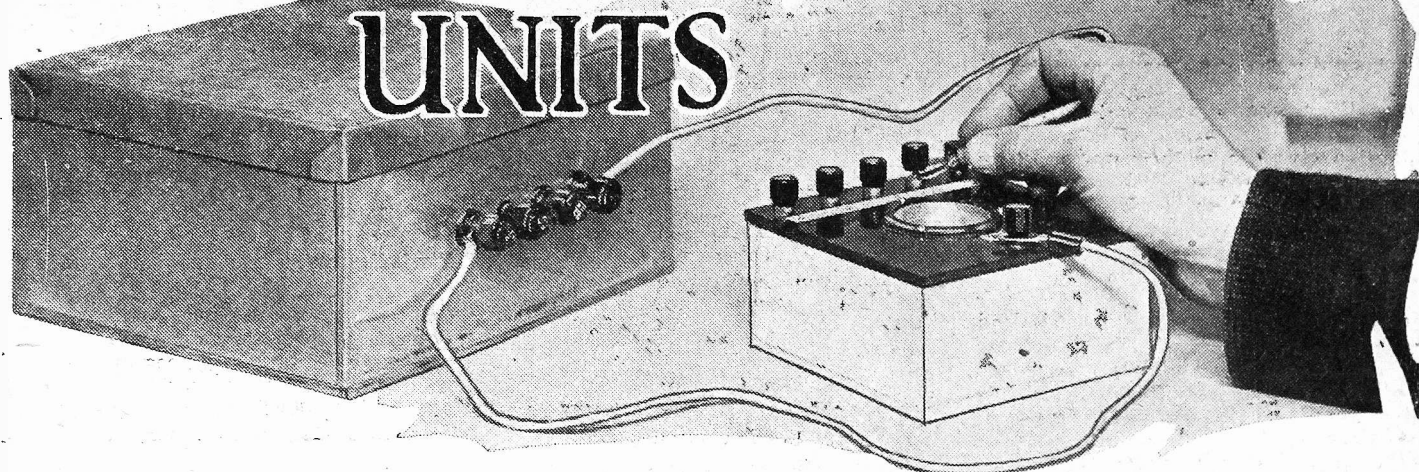
### Plug-in Coils.

I know plug-in coils are a nuisance, but they have very useful qualities. They have a low R over L ratio for one thing. For another you can get right down and up in the waveband very efficiently. The sole difficulty and the reason why they have been abandoned is because they will not gang. But if you are using a two-circuit arrangement, with a detector and two-note mag. afterwards, the plug-in coil still has great merits. By using a coupled circuit you can even get a variable band-pass, but you have to get to know your set.

In sum, coil units must be well made and have a high efficiency. For high-frequency mag. they must be screened, when they can be moderately small. When unscreened, size means efficiency. Peak tuning is good in spite of theoretical disadvantage. Peak tuning is necessary with the simpler and cheaper sets. The best peak tuner—well, I've said that already!



# A METER FOR MAINS UNITS



IN the early days of broadcasting the only duty which an H.T. voltmeter was called upon to perform was to measure the voltage of ordinary H.T. dry batteries. If it took rather a lot of current it did not much matter as, after all, it was used only for a few seconds at a time.

This pleased the manufacturers tremendously, for it was infinitely cheaper, and easier, to turn out low-resistance meters which had good healthy appetites, than the highly sensitive instruments that consumed only a milliampere or so for a full-scale deflection.

## Misleading Reading.

The result was that the British market became flooded with cheap, inefficient voltmeters, some of which required as much as 25 milliamperes to push the needle over to the 100-volt mark. Now with dry batteries and H.T. accumulators this did not worry us a great deal, provided the meters were not used for too long.

When mains units came along we were really up against it. A particular unit was probably designed to give about 120 volts at, say, 15 milliamperes. Without thinking, we probably put the voltmeter across the output terminals, and were no doubt horrified to find that it gave a reading somewhere in the neighbourhood of 50 volts.

## "What Now?"

"Whatever has happened now?" we probably thought. Well, the mains unit simply had not sufficient power to push the needle over. Obviously we could not get 25 milliamperes out of a unit that was designed to give only 15 milliamperes or so. A dry battery or accumulator has a fairly low internal resistance, and is capable of giving fairly heavy current for short periods. On the other hand, a mains unit is just the opposite and has quite a high resistance, due mainly to the smoothing chokes, and voltage-reducing resistances.

The result is that the unit will give only a limited current at anything approaching the normal voltage. As soon as we try to draw more from it, the internal resistance

An extremely useful instrument that will enable you to check the voltage output of your mains unit. It puts practically no load on the unit, taking only two milliamperes for a full scale deflection. It has four voltage ranges, and will also measure currents up to two milliamps.

comes into play, and the volts just fade away. What we really require is an instrument that takes very little current, something in the neighbourhood of 1 milliampere for a full-scale deflection.

## A Quick Conversion.

Such meters have to be extremely sensitive and, needless to say, are very expensive; but if you happen to have a milliammeter by you with a range of, say, 0-2 milliamperes or perhaps 0-5 milliamperes, you can very quickly convert it into an extremely sensitive and efficient H.T. (and L.T. for that matter) voltmeter.

Most of you probably know Ohm's Law, which tells us that the current flowing in a circuit is equal to the applied voltage divided by the resistance. Or twisted round a little, that the resistance in a circuit can be found by dividing the current into the voltage.

## A Multi-Ranger.

Well, now we will assume that we have a 0-2 milliammeter, and we want to turn it into a voltmeter, and make it read from 0-200 volts. That is, each milliammeter division will represent 100 volts. By making use of Ohm's Law we can easily see that we require a resistance in series with the milliammeter of such a value that it will pass 2 milliamperes at a pressure of 200 volts.

Therefore:

$$\text{Resistance} = 200 \text{ volts} \div .002 \text{ amps.} \\ (2 \text{ milliamps}) = 100,000 \text{ ohms.}$$

So, if we take a 0-2 milliammeter and connect a 100,000-ohm resistance in series with it, the instrument then becomes a voltmeter, reading in hundreds of volts. A 0-1 milliammeter will read from 0-100 volts, and a 0-5 milliammeter from 0-500 volts, and so on.

What is more important, it will consume only 1 milliampere for each 100 volts. How much more satisfactory than our low-resistance meter eating up its 25 milliamperes. Now I am going to tell you how to make a very useful instrument on these lines. Not one just reading over a single voltage range, though, but a multi-range affair which has many uses.

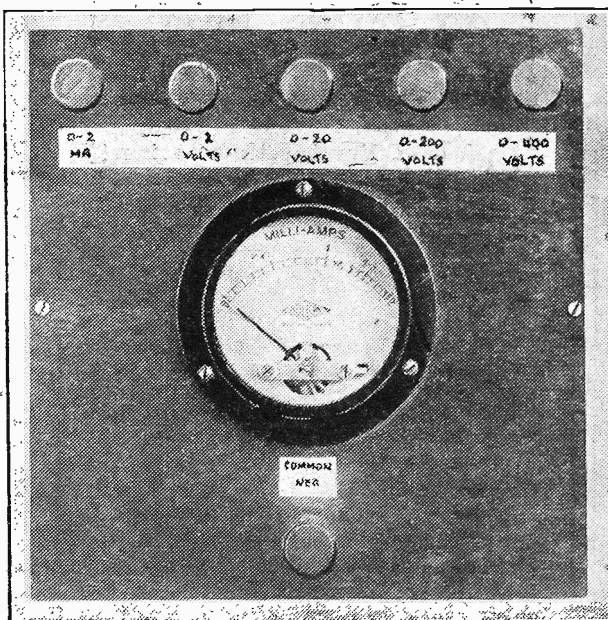
## Some Examples.

I knocked one up myself a week or two ago, and besides reading from 0-2 milliamperes (its normal range) it reads from 0-2 volts, 0-20 volts, 0-200 volts and 0-400 volts. The different ranges are obtained by separate series resistances of the correct value.

If you look at the accompanying diagram and photographs, you will see that it has a row of terminals along the top to which the different resistances are connected. All the values are calculated from the formula mentioned previously.

(Continued on next page.)

## IT MEASURES VOLTS AND MILLIAMPS



This photograph of the finished meter needs little explanation. The lower terminal marked "Common Neg." is common to all the ranges, the positive lead being joined to one of the terminals at the top.

## A METER FOR MAINS UNITS

(Continued from previous page.)

e.g. Resistance = voltage ÷ current in amperes.

Just to give one more example, let us take the 0-2-volt range. Well, the required resistance equals 2 volts divided by .002 amperes (2 milliamperes) which works out to 1,000 ohms.

### Small Percentage of Error.

I will not say that this instrument is dead accurate, but it is quite good enough for ordinary use. The error, if any, depends largely on the accuracy of the series resistances, which can be purchased at random, and even then not be more than 10 per cent out. There are some makers, however, who guarantee all their resistances to within 5 per cent, which, after all, is not at all bad.

In this latter case it would mean that the maximum error would not exceed 5 volts in every 100 volts. In my own case I used the ordinary spaghetti type. These are very convenient, as they take up very little space and, although other patterns can be used, these are really the most satisfactory.

The constructional work needs hardly any comment as it is perfectly straightforward. The ebonite panel measures five inches by five inches, and the large hole for the milliammeter can best be cut with a fret saw. A start for the saw is made by drilling a small hole.

### The Connections.

The box can be made very easily from ordinary three-ply, and can be knocked together in no time. Tiny brass brads are very useful for keeping it together, or if you can get small enough wood screws, perhaps these would be better. Only, if you use the latter, make sure that you make the holes for them first of all.

Before leaving you to get on with the good work, perhaps it would be as well for me to say a few words about the connections to the various terminals. You will notice

one terminal all by itself at the bottom of the panel. This is the common negative, and is joined direct to the negative side of the milliammeter.

The extreme left-hand terminal at the top goes to the positive side of the meter, and enables the instrument to be used for the purpose for which it was originally designed. That is as a milliammeter. The remaining four terminals are each connected to one end of separate resistances. The values of these resistances in order are: 1,000 ohms, 10,000 ohms, 100,000 ohms, and 200,000 ohms. These give ranges of 0-2 volts, 0-20 volts, 0-200 volts and 0-400 volts respectively.

### LIST OF PARTS.

- 1 Panel, 5 in. by 5 in. (Permeol, Becol, Ready Radio, Peto-Scott).
- 1 Cabinet to suit (see text).
- 1 Low-range milliammeter 0-2 or 0-5 (Bulgin, Ferranti, Weston, Wates).
- 1 1,000-ohm spaghetti resistance (Bulgin, Telsen, Peto-Scott, Varley, Lewcos, Sovereign, Magnum, Tunewell, Igranite).
- 1 10,000-ohm spaghetti (Lewcos, etc.).
- 1 100,000-ohm spaghetti (Varley, etc.).
- 1 200,000-ohm spaghetti (Magnum, etc.).

The free end of each resistance is now taken to the positive terminal of the milliammeter. All this is made quite clear in the wiring diagram, but remember that this diagram shows the instrument as it appears looking at it from behind.

When you have made up this little gadget you will be astonished at its usefulness. When I converted an old milliammeter that happened to be lying about, and was seldom used because of its low reading, I thought it might be handy, but it has turned out to be one of the most useful instruments that I have in my possession.

F. B.

## AN IRON "IRON"

A Useful Soldering Tip.

"OH, dash, I've forgotten the iron!" Do you often use those words, or rather stronger ones, as explanation for the sprint to the kitchen which you then make, in a—usually—vain attempt to retrieve your soldering-iron before all the tinning is burnt off? If so, this scheme may help you.

A little while ago the writer tried his hand at making a soldering-iron, but as there was no copper available for the bit a piece of iron was doubtfully used instead.

### Surprisingly Effective.

There was some slight difficulty in initially tinning it, but this was overcome by placing a small piece of solder on a block of sal-ammoniac, dropping a few spots of "killed spirits" on, and then rubbing this with the hot iron.

The completed iron "iron" functioned well—surprisingly so—with the very great

advantage over copper-bit ones that no amount of heating impairs its tinning. After keeping at red-heat for an hour a quick rub on the sal-ammoniac block (useful, by the way, for any soldering-iron) is ample preparation for more work. This success is, of course, due to the great affinity of tin for iron, and the softer the latter is, the better. Perhaps the only disadvantage is that when soldering large objects an iron bit does not appear to retain heat quite so well as a copper one, but for wireless work this is no drawback.

### Try It Yourself.

When heating this iron don't wait for the flame to be tinged green, as with a copper one; it will turn orange instead.

If you are a "Doubting Thomas," I would simply say: Try this idea with a large nail, first. Copper soldering irons are a back number with me now, and this simple test should make you think so, too.

"CLED W."

## CONE LOUDSPEAKERS

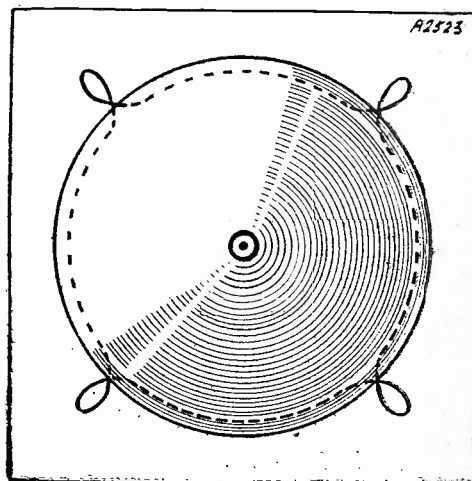
A description of a novel method of suspension.

FOR some time the type of simple cone on a baffle board, or mounted in a cabinet, seems to have become standard, but I think there is scope for considerable experimenting by intelligent amateurs.

### For Good High Notes.

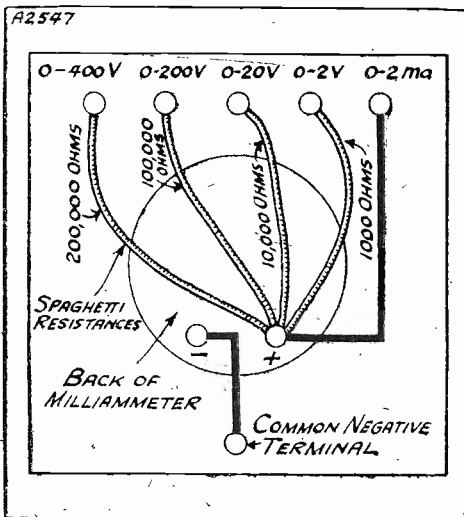
The method of attachment of the folded cone often leaves much to be desired. The more free it is the better, and after trying all the methods, I find the best plan is to lace a thin string round the cone as shown in the sketch, bringing it out at four corners in the form of loops. The string must, of course, be glued to the edge of the cone so as to prevent the possibility of a "buzzy" rattle. The four loops are glued to the baffle board or cabinet front, and form an almost ideal type of suspension, as they offer very little impedance to a perfectly free movement.

## SUPPORTED BY STRING



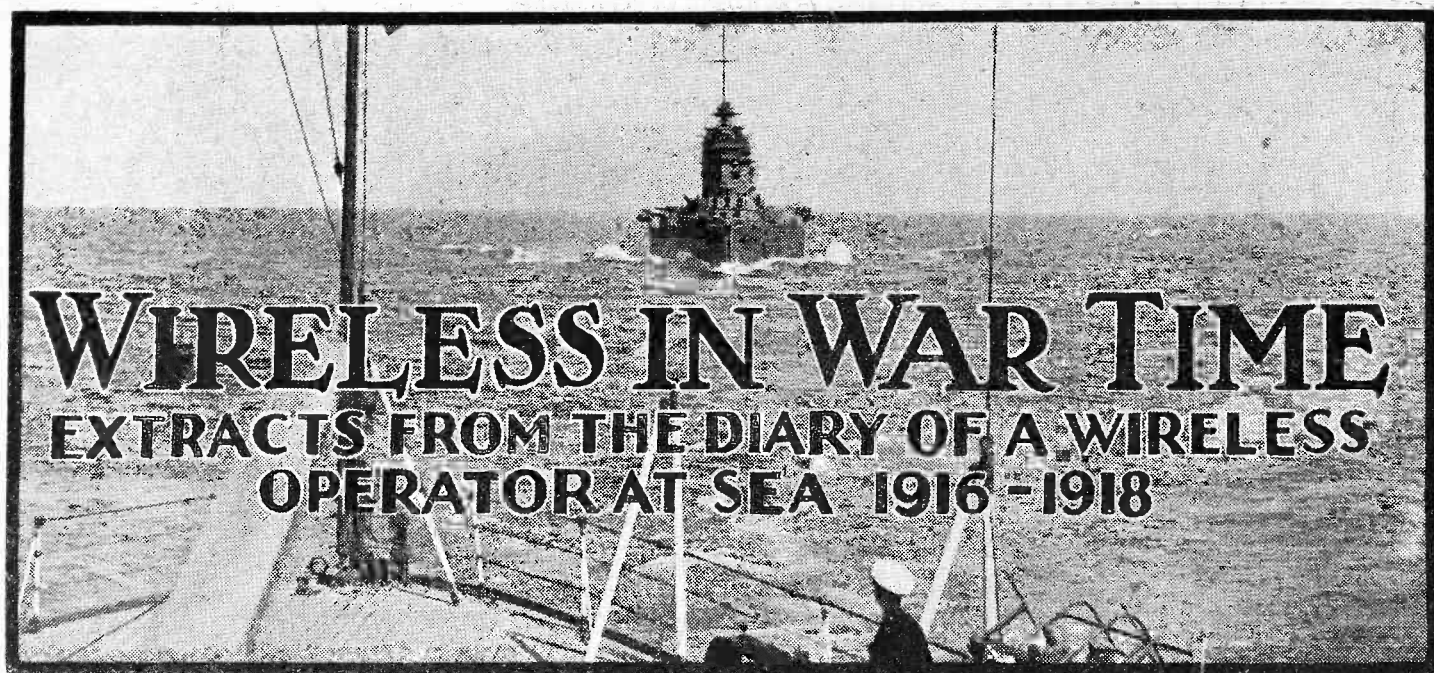
The cone is supported by the four loops, the string being continued round the periphery and glued firmly in place.

## LOOKING AT THE BACK



Here you see a back view of the panel, showing how the various resistances are connected. When building this instrument it should be remembered that its accuracy depends on the accuracy of the spaghetti resistances.





ON board His Majesty's Transport

Sunday, November 26th, 1916. I slept on board last night and woke to find the radiator spouting steam and hot water with fine gusto! Considering this is the first time I have slept in a bunk I was very comfortable. On duty in the wireless cabin for the first time. The set is a  $1\frac{1}{2}$  kilowatt Marconi Rotary Spark transmitter, with a Type 31a Crystal Set. The crystal is carborundum and, although not frightfully sensitive, seems to be pretty reliable.

#### Gun Practice!

NOVEMBER 27TH.—We sailed from Belfast this morning and, once out of harbour, the Captain gave orders for the gunners to try out our 4.7 gun. When the confounded thing went off I thought we had struck a mine, and quite expected it would be a case for an SOS and possibly a trial for a life-saving belt!

NOVEMBER 28TH.—A fairly uneventful day. I am on duty in the wireless cabin from 2 until 8, so altogether I get twelve hours on and twelve off.

NOVEMBER 29TH.—Have just come off duty after a six hours' spell. Received official warnings concerning dangerous parts of the Channel and as to the movements of two enemy submarines observed off Fastnet. Picked up the war news from Poldhu, and we were all glad to hear of the Zeppelin brought down in Yorkshire. It is very cold and blowing hard. 8 p.m. Spent an exciting half-hour, but a deuced cold one, on the Bridge, reading flashlight signals from one of our escorting tugs. Picked up signals from Crookhaven, St. Patrick's and Poldhu, but missed the Eiffel Tower owing to bad jamming. Dined on porridge and fish and chips. I guess I shall be sick before long!

#### Some Good Yarns.

DECEMBER 2ND.—It has taken me about four days to recover from my first bout of mal de mer. At any rate, my dinner to-day consisted of two plates of oxtail soup (well dashed with H.P. sauce), a large plate of rabbit pie, plum pudding, biscuits and cheese, not to mention apples. They seem

to feed us well on this boat, and I guess I've recovered. The Captain is rather worried about the submarine reports I hand to him from time to time. He has scarcely left the Bridge during the last twenty-four hours. At dinner to-day our Chief Engineer was telling some good yarns.

One was about a man who had a boiler burst near him and was practically skinned alive; but the doctors kept him in a bath of oil for seventeen weeks and he is now O.K.

Field-Marschals, Generals, Admirals, Air Marshals, War Ministers, Ex-privates, Ex-sergeants, and, it would be true to say, literally hundreds of men who participated in one way or another in the Great War, have published their memoirs, or their diaries, or their recollections of "Those Stirring Days." But we think this is the first time that the personal story of a wireless operator at sea during war time has appeared in print, and we are pleased to begin publication in this issue of "Popular Wireless" of exclusive extracts from a diary kept by a young wireless operator who served at sea from November, 1916, until 1918. For various reasons he wishes to hide his identity under the nom-de-plume of "Sparks"—the nickname given to all wireless operators at sea; but the Editor is satisfied that these memoirs are perfectly genuine, and feels sure that many thousands of younger readers of "Popular Wireless"—many of whom were not born when this diary was written, and many of whom were, perhaps, in the nursery or at school, will appreciate these racy extracts dealing with those stirring times when the whole world was at war and when, in particular, sea-going life was an exciting adventure which young fellows of to-day might well envy.—THE EDITOR.

and has grown a new skin. Very few signals in the cabin to-day, and thank heaven for some magazines, otherwise it would be rather monotonous. The First Mate's opinion of the weather qualities of this boat are quite lurid, but for all that I like it, and we are getting to be good friends all round.

DECEMBER 3RD.—Received no news from Poldhu. By the way, signals are getting weaker. These carborundum crystals are not so sensitive as they might be. Noted with surprise that Mr. Lloyd George has handed in his resignation to Mr. Asquith, but has been asked to form a Government in conjunction with Mr. Bonar Law. I hear we are bound for Port Arthur, Texas, to collect oil for destroyers. With luck, we shall be back in England in February.

#### We Prepare For Trouble.

DECEMBER 4TH.—It seems we are going to call in at Halifax, Nova Scotia, in order to replenish our coal supply, which is rapidly diminishing at the rate of sixty tons a day. In spite of this high consumption, we only average eight knots. It is a sore subject with the Chief Engineer, who waxes very profane whenever it crops up.

DECEMBER 7TH.—Yesterday the Senior Operator received information from Cape Race (V.C.E.) concerning an armed German merchant cruiser last seen patrolling in the vicinity of  $48^{\circ}34'$  north longitude,  $27^{\circ}57'$  west. Now our position at the time of writing is  $46^{\circ}33'$  north, and it's on the cards we will meet her. At any rate, when I informed the Captain he had the boats prepared and swung clear. He next interviewed our gunner and gave him his instructions, and finally, he instructed the other operator and myself. The Captain forbade us to reveal any information to the crew.

#### A Cry In The Night.

We have also been warned as to submarines seen travelling north. Heard that Bukarest had fallen, but Poldhu is now very weak and soon we shall be right out of range. The ship is rather nervy at present, and I will quote an incident that occurred last night to prove the point.

I turned in at 8, but being a bit excited, promptly experienced a first-class nightmare and, about 9.30, I woke up and gave a most fiendish yell. At the same time I realised that it was only a dream, and lay back cursing myself roundly. But the yell was out. Instantly several doors banged and I heard the Captain's voice outside.

(Continued on page 200.)

# NOTES FROM THE NORTH

**A change of policy in North Regional broadcasting is observed by our northern correspondent in his monthly notes. He also explains the summer programme plans of the B.B.C. in this region.**

**L**ISTENERS who have followed the activities of the B.B.C. in the north of England during the past three years will perhaps have noticed a gradual change which has been coming over the complexion of North Regional broadcasting in more recent times; or perhaps the change may have escaped their notice because little, or nothing, has been said about it.

## Local Talent.

There was a time when a large proportion of the energy of the B.B.C. officials in the north was concentrated on activities in the studio. When plans were prepared for the building of the North Regional high-power station, the Regional staff, fully aware of the plentiful talent available in the north, had visions of the fine programmes they would be able to present from the studios through the new transmitters.

Then the Northern Wireless Orchestra was disbanded by decree of Savoy Hill. Inevitably this placed a limit on studio activities. Improvements in the land-lines also facilitated the freer interchange of programmes between stations, and it became a matter for argument whether there was any reason why an orchestra playing in the Manchester studio should be any better than one relayed from the London studio.

For these, and other reasons, the North Region has been thinking less in recent times of studio productions, and more of outside broadcasting. Studio activities are, of course, continuing; but we have now, it seems, reached a stage in the progress of provincial broadcasting when it may well be argued that the first function of the Regional programme organizers is, by means of extensive outside broadcasting, to make their programmes a reflection of activities throughout their region.

## Preparing for the O.B.'s.

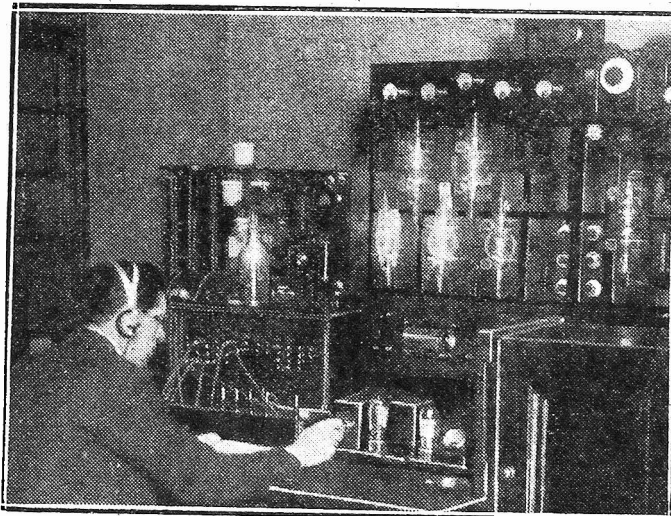
The purse strings of the B.B.C. are firmly held by Savoy Hill, and whilst the headquarters officials have been known to raise objection to schemes for expensive studio programmes in the provinces, I believe that there is rarely, if ever, any objection to the expense involved in outside broadcasting of the sort that is now undertaken so extensively in the North Region—not only running commentaries and relays of outside concerts, but relays from theatres, music-halls, seaside pavilions, etc.

During the coming summer there will again be a big scheme of relays from holiday

resorts. At the moment of writing, negotiations are afoot between the B.B.C. and Buxton, Bridlington, Whitby, Scarborough, the Isle of Man, Blackpool and other resorts.

The bands, orchestras, concert-parties and other attractions of these resorts have given great pleasure to northern listeners in past seasons, and this year it is anticipated that some of these programmes will also be relayed by the Midland and London Regional stations.

## THE FIRST ENGLISH RELAY



This is a view of some of the apparatus of the Sheffield station, which was the first to be commissioned in England for relaying programmes. It stopped radiating when the North Regional started up.

The Isle of Man is again to figure in the North Regional programme, with a relay of the Senior Tourist Trophy motor-race in June; a broadcast of the ancient Tynwald ceremony, and other features of Manx life.

Alongside of this scheme the B.B.C. officials in the north are going in for fuller co-operation with theatres and music-halls. This commenced round about Easter, when the Manchester Hippodrome and the Leeds Empire were presented to radio listeners for the first time. These northern theatre relays are usually carried out very capably, and listeners may look forward to increasing enjoyment from this source.

As far as studio programmes are concerned, it is obvious that so long as concerts continue to be broadcast from provincial studios, an "orchestra" of nine players is too small for the presentation of any music much above the café-band standard.

The Northern Studio Orchestra is excellent as a stop-gap, but, in spite of the increased importance attached to outside broadcasting, studio concerts of a more substantial nature are still occasionally prepared. It has been decided to augment the Studio Orchestra regularly, once a fortnight. It will then be brought up to about 30 strong.

The Yorkshire Mummers and the Lancashire Mummers concert parties, broadcasting respectively from the Leeds and Manchester studios, are to continue as a regular feature of the North Regional programme well into the summer, and in addition the B.B.C. is organizing at Manchester a new concert party to be known as the Micro-Pierrots. This will have a different style to the other two parties which indulge considerably in the native dialects of the two counties.

## No More Long Plays.

Long plays are to be discontinued during the summer, but there is a possibility of a number of radio pageants written round the history of certain towns such as Durham and Chester. Whether these programmes will materialise depends largely on opinions regarding Mr. L. du Carde Peach's "Pageant of York," broadcast on April 6th.

The alterations to the old Quaker Meeting House at Leeds which is being converted into studio and control-room premises are now well on the way,

and the new underground land-line route from Leeds to Edinburgh via Newcastle is now in use.

Programmes relayed between England and Scotland follow this route instead of the old overhead land-line from Leeds to Glasgow.

A quite remarkable feature of broadcasting in Yorkshire lately has been the extraordinary growth of listening groups. In October last there were 45 groups which regularly listened to broadcast talks. There are now 145.

Fourteen Yorkshire Schools of Art listen to the Tuesday evening talks on art, and an instance of the enthusiasm

with which this sort of thing is being taken up in Yorkshire is provided at Keighley, where a choir of some 50 people is listening to Mr. Victor Hely-Hutchinson's Monday evening talks on music.

## A Whole Time Job.

Yorkshire is the only county which has its separate Area Council for Broadcast Adult Education, and at Leeds there is a B.B.C. official who gives his whole time to the secretaryship of this Council and to organizing group listening amongst the unemployed.

On April 2nd a conference for members and leaders of Yorkshire's 145 groups was held at Leeds. Professor J. Strong, of Leeds University, gave an address on "The Place of Broadcasting in Adult Education," and Mr. R. A. Rendall of the B.B.C. spoke on the winter and summer programmes.



# CAPT. ECKERSLEY'S QUERY CORNER



Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

Don't address your letters direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

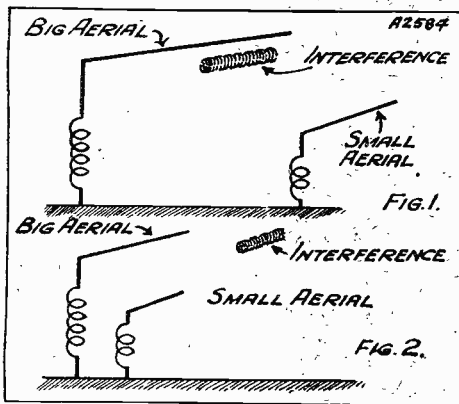
## The Better Aerial for Dodging Interference.

B. J. U. (Lancaster Gate).—"I use a fairly sensitive receiver for reception of the main continental and several of the English stations, and although the selectivity of the receiver is quite good, I am greatly troubled by interference from machinery situated locally.

"Which would be the preferable arrangement of the aerial, a large outside aerial with means for obtaining adequate selectivity in the receiver, or a small indoor aerial with fairly tight coupling to the receiver? Which arrangement should give the greatest freedom from the interference experienced?"

It's very difficult to say. Sometimes the interference-producing machinery radiations are very local and die away quickly,

## NOISE FROM MACHINERY



A great deal depends on the aerial's distance from the source of interference.

in which case a small indoor aerial would be better. This is true in degree always.

But much depends upon how close you are to the interference. If very close you can weaken it by moving relatively quickly away from it, i.e. by increasing the distance of your aerial from the interference by a large ratio.

If you are already aerial dimensions away you won't make much difference in drawing in your horns as it were. In Fig. 1 you have altered the relative distance from the aerial very much by using the small one. In Fig. 2 there is hardly any difference in relative distance of the two aerials, but the small one may be a tiny bit better.

## Amplification and Power Output.

L. A. L. (Andover).—"Can you tell me how I shall know whether I ought to use a super-power or an ordinary-power valve. This is what puzzles me:

"There are two valves by the same maker, one of them has an amplification factor of approximately twice the other and needs only half the grid bias. If I get a valve with the higher amplification factor, I ought to get more magnification, and in consequence there is no need for me to apply such a big signal to the grid as would be necessary in the case of the valve which has only half the amplification factor.

"Why is it necessary to use a valve in the last stage capable of handling a big swing, when one loses so much in amplification by using a valve of this type?"

## It's Power That Counts.

Amplification is not power. I could get a valve requiring a grid sweep of 0.5 volts to apply 200 A.C. anode volts to my loudspeaker. But the loudspeaker demands power, and the valve I mention might not give that power.

Again, high-amplification valves have high internal impedance. Most loudspeakers have relatively low impedance at lower frequencies. So a high-impedance, high-mag. valve, in not matching the impedance of a loudspeaker load, is not efficient, and will not deliver the required power.

If I use a step-down transformer, then it's all right as far as matching goes, but I have to drop the volts applied to the speaker, and it again comes down to what power I have available.

You have 230-volt mains. You light all your lamps and warm the house by electricity from these mains. At least, let me assume this.

You have a motor car which has a magneto. That magneto absorbs hardly any real power to drive it, but it may deliver 100,000 volts! It wouldn't do any good to substitute the magneto for your mains, even though it is a very high mag. device!

Power—Power—Power—Power! and power is volts  $\times$  amps—(with unity power factor, anyway).

## Using Enamelled Wire.

"CURIOUS" (Cheam).—"Recently I erected a new aerial. The wire used for my old aerial was ordinary 7/22 hard-drawn copper, and when I went to my dealer he

suggested that this time I should use enamelled copper, because he said it was much better.

"I cannot understand this because I should have thought that the enamel covering on the wire would have resulted in a loss of volume, since I understand that the enamel used is a good insulator.

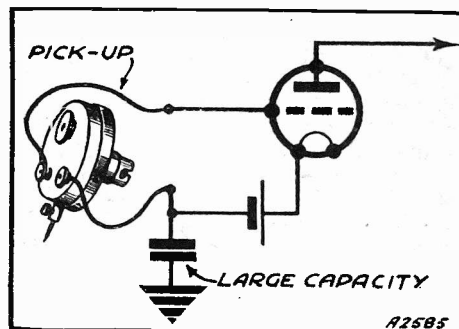
This is curious—same question cropped up again! It's easy; same answer twice.

Why should an insulator shield waves? The air is an insulator, but the waves go through the air all right. Brick is an insulator—some of us use indoor aerials. Wood is an insulator, but a portable set picks up its signals through wood.

A painted portable picks up energy. An enamelled portable would pick up energy. So an enamelled wire will pick up energy.

Good enamelled wire is quite satisfactory for aerial wire.

## STABILITY WITH A PICK-UP



This diagram illustrates the answer given last week to J.M.D. (Belfast), explaining how a pick-up may be earthed through a condenser to improve stability.

## Hiss from a Super-Het.

P. R. (Salisbury).—"My receiver is of the super-heterodyne type, and its sensitivity is very good. I find, in fact, that it is too good, because, if I attempt to use all the H.F. amplification on weak signals, reception is accompanied by a hissing noise which borders on a mild roaring.

"What causes this noisy background?" I should be sure (1) That the oscillating valve is biased well negative, and never allows grid current, and (2) see that you inject the new local oscillations as far up the chain of first amplifier as possible.

Thus you can introduce the oscillations at the central point, then magnify the resultant, then do the first detection. It is better to do the amplification of the signal at that signal's frequency first, then inject the local oscillation and immediately do the first detection, otherwise you amplify hiss from the oscillator.

ONLY IN "P.W." can you read Capt. Eckersley's replies to listeners' own problems. AND REMEMBER—Captain Eckersley's technical articles appear only in "POPULAR WIRELESS" and "MODERN WIRELESS."

MIRROR OF THE B.B.C.

By O.H.M.

## THOSE NEWS BULLETINS

SCOTTISH ORCHESTRAS—MR. HUGH JOHNSTON STICKS IT—  
P.M.G. AND THE B.B.C.—THE MOVE TO BROADCASTING HOUSE

I HAVE been listening a good deal lately to the news bulletins, comparing them with their predecessors of six years ago or so. It seems to me that the bulletins have drifted into a kind of routine rut. There is hardly the degree of originality and independence that one would expect from the fact that the bulletins are now actually compiled and edited at Savoy Hill. No doubt the substantial news is covered, but it might be done with more vivacity and lightness.

### Scottish Orchestras.

All is not serene in Scotland over the B.B.C. intervention to establish and support a new National Orchestra north of the Tweed. Sir Hugh Robertson has become the spokesman and leader of the active critics.

Sir Hugh states that the Music Advisory Committee of the B.B.C. in Scotland was not consulted before the scheme was launched, and that one result of this absence of consultation is that the new B.B.C. enterprise will cripple worthy existing orchestral activity without providing an adequate replacement. It looks as if Sir Hugh and Mr. David Cleghorn Thomson are in for a battle royal.

### Mr. Hugh Johnston Sticks It.

The Rev. Hugh Johnston, rector of Cranleigh, the originator and inspirer of the daily morning service, has managed so to adjust his parochial duties as to enable him to continue with his broadcasting. These morning religious services remain one of the most popular and most generally appreciated features of the programmes. The Rev. "Pat" McCormick, of St. Martin's, is Mr. Johnston's partner in this work.

### P.M.G. and the B.B.C.

There are persistent rumours that relations between the Postmaster and the B.B.C. are not as smooth as they might be. Lobby gossip has it that the Treasury covets the B.B.C. funds, especially since seeing the balance sheet for last year, which reveals a remarkably healthy state of affairs.

Members who are hostile to the B.B.C. are exploiting the situation in the hope of crippling their *bête noire*. On the other

hand, friends of the B.B.C. are not inactive, and I do not anticipate a victory for the "antis." Still, the B.B.C. would be better advised to take the public more into its confidence on this subject of finance, which has been guarded too carefully in the past.

### Interchange of Programmes Between America and England.

The long-awaited and much-discussed interchange of broadcast programmes between England and America is at last beginning to take place. I was afraid nothing much would come from the talk that has been going on ever since broadcasting began.

Although one felt that something would be accomplished after Sir John Reith had stated that something was to be done in

the matter on his return from the United States about a year ago. A series of what are called "reciprocal" programmes has been suddenly fixed up between the B.B.C. and the Columbia Broadcasting System of the United States.

By the time this note appears the Columbia people will already have given British listeners a talk on Friday, April 22nd. American listeners are to hear a performance of "Comus," which goes out from London Regional at 11 p.m.

Two classes of programmes will be broadcast under the new arrangement, described as "informative" and "characteristic," one being to tell something and the other to show it.

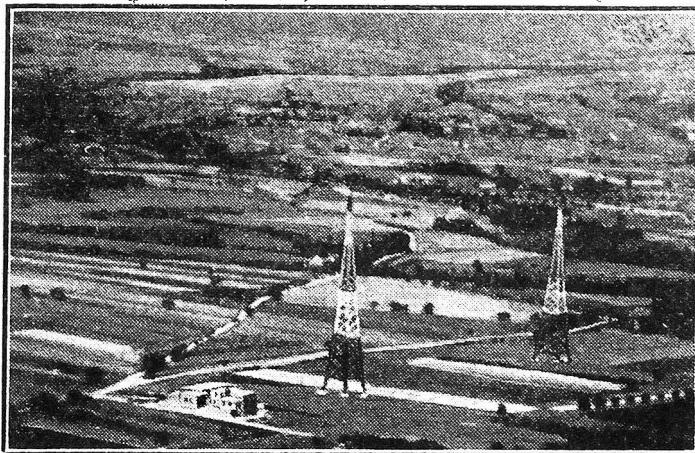
Thus, the Columbia talk comes under the definition of "informative," and "Comus," which is designed to show what British broadcasting can do to put the music and poetry of Arne and Milton on the air, as "characteristic." I understand that later in the series British listeners are to have a programme in which an attempt will be made to give a radio impression of Broadway, and that in return we shall treat our American cousins to a similar entertainment founded on the atmosphere of Leicester Square.

The series will run for eight weeks, during which time two talks will be given in America and two in England, on the common subject of "school" and "college" life in the two countries. Each programme will last for thirty or forty-five minutes, and will start at 11 p.m.

### The Move to Broadcasting House.

From what I hear the change over of the Publications and Programme staffs from Savoy Hill to Broadcasting House at the

## LEAGUE OF NATIONS SHORT-WAVE STATION



This interesting bird's-eye view of the new station opened by the League of Nations was taken from the Stuttgart-Geneva air liner as it was passing over the Swiss town of Prangins.

## THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

THE mid-week vaudeville hour hadn't anything of outstanding merit, and there was certainly nothing new in the way of songs. All the artistes relied on popular melodies. Max Miller was amusing in some new jokes, most of them at the expense of his wife.

Carr Lynn went through the farmyard as mimics do, and a visiting circus in the neighbourhood gave him an opportunity to introduce some of the wilder animals. In these he was very clever. Elsie Carlisle crooned love-songs which made me writhe—the studio audience, on the contrary, liked her.

Jenny Howard and Percy King, in the "Street Singers," were a lively pair, especially Jenny Howard, who aimed at something reminding one of Cecily Courtneidge

and that one-time popular music-hall artiste, Harry Weldon.

Johnson Clark, the ventriloquist, hadn't anything better than the bewhiskered story of the squire with the long beard, and the query it raised as to whether he puts it over or under the sheets at night. Again the studio audience laughed heartily. Really, it makes one wonder where such people come from! Lastly, Rudy Starita played vibraphone and xylophone solos,—and very well, too—but Teddie Brown's recent wireless activity must have robbed this turn of some of its appeal.

Sir Daniel Hall's fortnightly talk on "Farming" was as virile as ever, and it will not be his fault if there isn't a revival in

## 140 STATIONS ON THE "COSMIC"!

..... I am a "Cosmic" enthusiast. A friend of mine has built it and up to date has identified about 140 stations on it. ....

P. M. CARMENT.

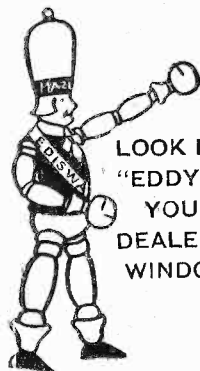
36, Westholm,  
Hampstead Garden Suburb,  
N.W.11.

(Continued on page 202.)



# HL2

METALISED



LOOK FOR  
"EDDY" IN  
YOUR  
DEALER'S  
WINDOW



Further evidence of the supremacy of the new range of 2-volt Mazda valves is here in the metalised H.L.2. Extreme sensitivity joins with absolute stability, and its high amplification coupled with a comparatively low impedance renders it particularly efficient as a leaky grid detector or intermediate L.F. amplifier. The steep slope of the H.L.2 also makes it suitable for use as an anode bend detector.

Mazda valves are 100% British made and designed by British engineers.

THE AMAZING

# MAZDA

THE  
BRITISH  
VALVES

## EDISWAN RADIO



# ANOTHER BIG ACHIEVEMENT IN THE NEW MAZDA 2-VOLT RANGE

### MAZDA 2-VOLT RANGE

H.210	-	7/0	PEN.230	17/6
H.L.210	-	7/0	PEN.220	17/6
★ H.L.2	-	7/0	PEN.220A	17/6
★ L.2	-	7/0	S.C.215	16/6
P.220	-	8/9	★ S.215A	16/6
P.220A	-	12/0	★ S.215B	16/6
P.240	-	12/0		

★ METALISED

THE EDISON SWAN ELECTRIC CO. LTD.  
RADIO DIVISION:  
155 CHARING CROSS ROAD, LONDON, W.C.2



The R & A 'Challenger' notwithstanding its phenomenally low price, will, given an undistorted input, reproduce speech and music with absolute fidelity. Its sensitivity is such that it gives satisfactory results when used with the average power valve, and it will accept 3 Watts undistorted A.C. without distress, thus providing a volume of reproduction more than sufficient for normal requirements.

**35/-**  
**INCLUDING**  
**MULTI-RATIO**  
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**TRANSFORMER**  
(TO R & A SPECIFICATION)

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**BRIEF SPECIFICATION:—**

8½" diameter, pressed steel, stove enamelled black, fitted with felt facing sectors.

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**COIL.**

1" diameter, 6.7 ohms impedance at 1,000 cycles.

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Forged 15% cobalt steel, cadmium plated. Flux density 6,800 lines per square centimetre.

**TRANSFORMER.**

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**"CHALLENGER"**

**PERMANENT MAGNET MOVING**  
**COIL REPRODUCER.**

**"QUEEN OF BRIDGE"**



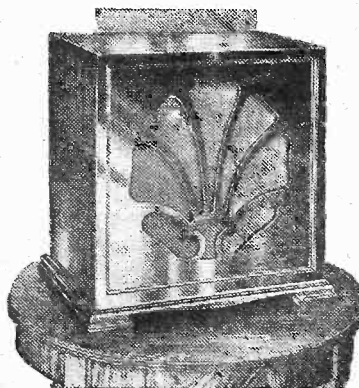
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*Teach You CONTRACT*

Of course you play bridge. These are days when everybody *does*. And now Contract is the game. A little more difficult than Auction, but how very much more fascinating! Mrs. Culbertson will teach you. Her famous husband declares that she is "the greatest bridge player and teacher in the world."

The first of her series of lessons appears in the MAY issue of the NEW LONDON MAGAZINE.

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**SPEAKER BETTER!**

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P.W.33

Every CAMCO Cabinet bears the CAMCO Seal





# Do you ever hear the Cowbells or the Siren ?

A "hot break" in the theme—that is the chance for the expert drummer. Now you'll hear the cowbells and the siren—interpreting the "falling" rhythm—introducing naturally that vocal chorus—that is what they're for! You'll hear them clearly, distinctly, *recognisably* if you use the pure and powerful current of an Improved Lissen Battery. The extraordinary power output of this battery makes noticeably true the performance of your loud-speaker.

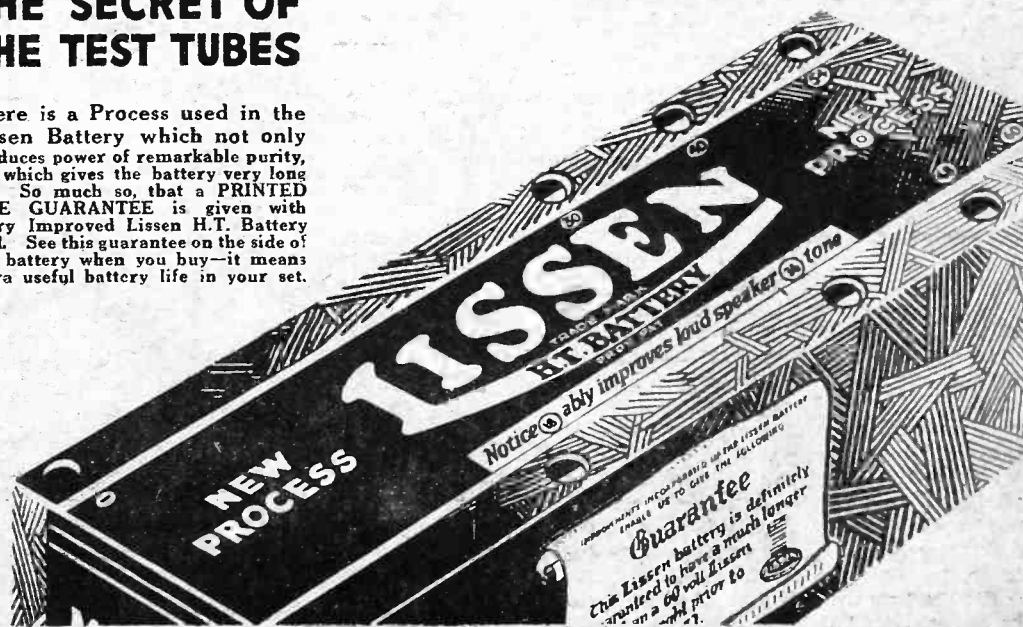
Ask by name for an Improved Lissen Battery. Obtainable at every radio dealer's.



## THE SECRET OF THE TEST TUBES

There is a Process used in the Lissen Battery which not only produces power of remarkable purity, but which gives the battery very long life. So much so, that a **PRINTED LIFE GUARANTEE** is given with every Improved Lissen H.T. Battery sold. See this guarantee on the side of the battery when you buy—it means extra useful battery life in your set.

60 VOLT  
WAS ~~7/11~~ NOW **5/6**  
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## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found-?

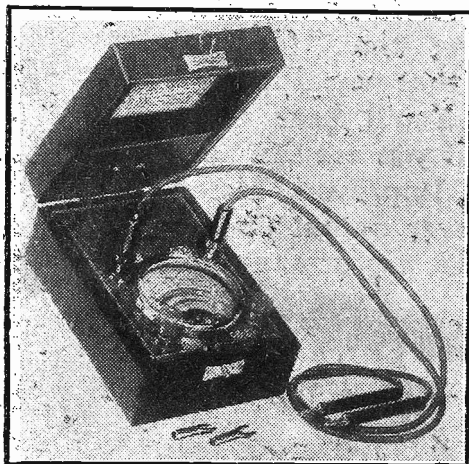


## A "PIFCO" ALL-IN-ONE RADIOMETER.

MANY radio enthusiasts must find themselves on the horns of dilemma in regard to measuring instruments. On the one hand are those inexpensive combination types of meters which, though they fulfil the requirements of the average listener, are not sufficiently accurate or suitable for "mains" and other more exacting tasks.

Alternatively, it is possible to obtain instruments which will cope with anything

## THE DE-LUXE MODEL



The Radiometer contains a tiny battery which enables continuity tests to be made.

—but are beyond the reach of most of our pockets.

However, there is now a solution to the problem in the form of the De-Luxe Model of the "Pifco" All-In-One Radiometer. This compact instrument will measure or test practically everything the radio amateur encounters.

It will measure H.T. and L.T. voltages up to 250 and 6 volts respectively and M/A up to 40, and valves and components can be tested for continuity.

H.T. mains unit outputs can be measured, for the device has a resistance of 125,000 ohms. And despite its compactness accurate readings are possible, for it has a mirror scale and knife-edge pointer.

Complete in a maroon bakelite case and with leads it costs £2 2s. 0d., and at that we consider it represents excellent value for money. We have compared its readings with those given by our separate (and costly) test meters and find its accuracy to be of the order claimed.

It is an instrument which we can recommend.

## THE TRIX "ELASTICATOR."

With all the dozens of stations which are nowadays operating on the medium wave-band, some method of logging their dial readings is essential. An excellent alternative to the rather labourious plotting of curves is the "Elasticator" made by Eric J. Lever (Trix) Ltd., and retailing at 3s. 6d. each.

It comprises a scaled rubber ribbon which you stretch out to make three or so noted readings correspond with any one of three station lists prepared according to the three types of condensers in most common use.

Then all you have to do is to read off the probable dial readings of any other stations you wish to tune in.

An ingenious article, and one which I find works to very close degrees of settings on an average type of set.

## BULGIN AGAIN.

You remember that "Quickwyre" which I recently described in "P.W."? Well, Bulgins are applying the principle to a "self-soldering" conductor. It is known as "Soldawyre," and comprises six strands of tinned copper wire and one strand of solder, so that all that is required is a little flux and a hot iron to make a sound joint.

The "slip-back" covering is in this case impregnated with a special wax compound which gives it sufficient strength to "stay put" when pushed back, so that the heat occasioned by the soldering does not cause it to fray.

"Soldawyre" costs 6d. per 8-ft. coil in either red or black, and it should be noted that you don't have to solder it, it makes a perfectly good conductor for terminal screw connections.

## NEW WATMEL POTENTIOMETER.

This is of the wire contact type, having a composition element and it is obtainable in the usual values. It is a particularly robustly constructed component and embodies several original and sound features of design.

The price is 4s. 6d. and on test we found samples to be perfectly satisfactory in every way.

Its movement is velvety, and you have the comforting knowledge that this smoothness is not obtained at the expense of contact reliability.

## THE BLUE SPOT INDUCTOR.

There is always at least one firm in every branch of industry which is a "safe bet." You know what I mean? A man asks you "Who makes good, inexpensive cameras?" or "Who makes good motor tyres?"

A name immediately occurs to mind—the answer is easy. But if the question were "Give me six firms you can recommend" you would find it more and more difficult to discriminate as you searched round in your mind for the last ones of the list.

Applied to radio we can provide an excellent example of the above by asking "Who makes good loudspeakers for sale?"

## PLEASE NOTE.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot, in any circumstances, undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

at prices within the reach of all? We don't think anyone would quarrel with "Blue Spot" as the answer to that!

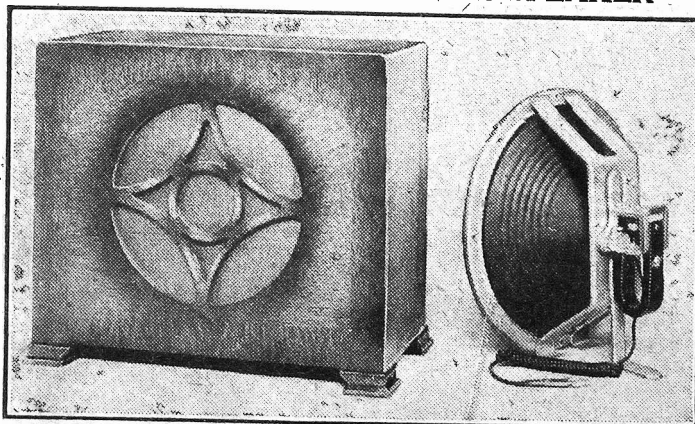
And this is why we are so pleased that Blue Spot are in production with speakers of the "Inductor" type, for their range is now complete.

Of course, the prices are right; 39s. 6d. for the complete chassis, and 63s. for the complete 100D loudspeaker in a fine oak cabinet.

This last I have in front of me as I write, in active use in connection with our new inter-office loudspeaker communication system, from which you will gather that I like it!

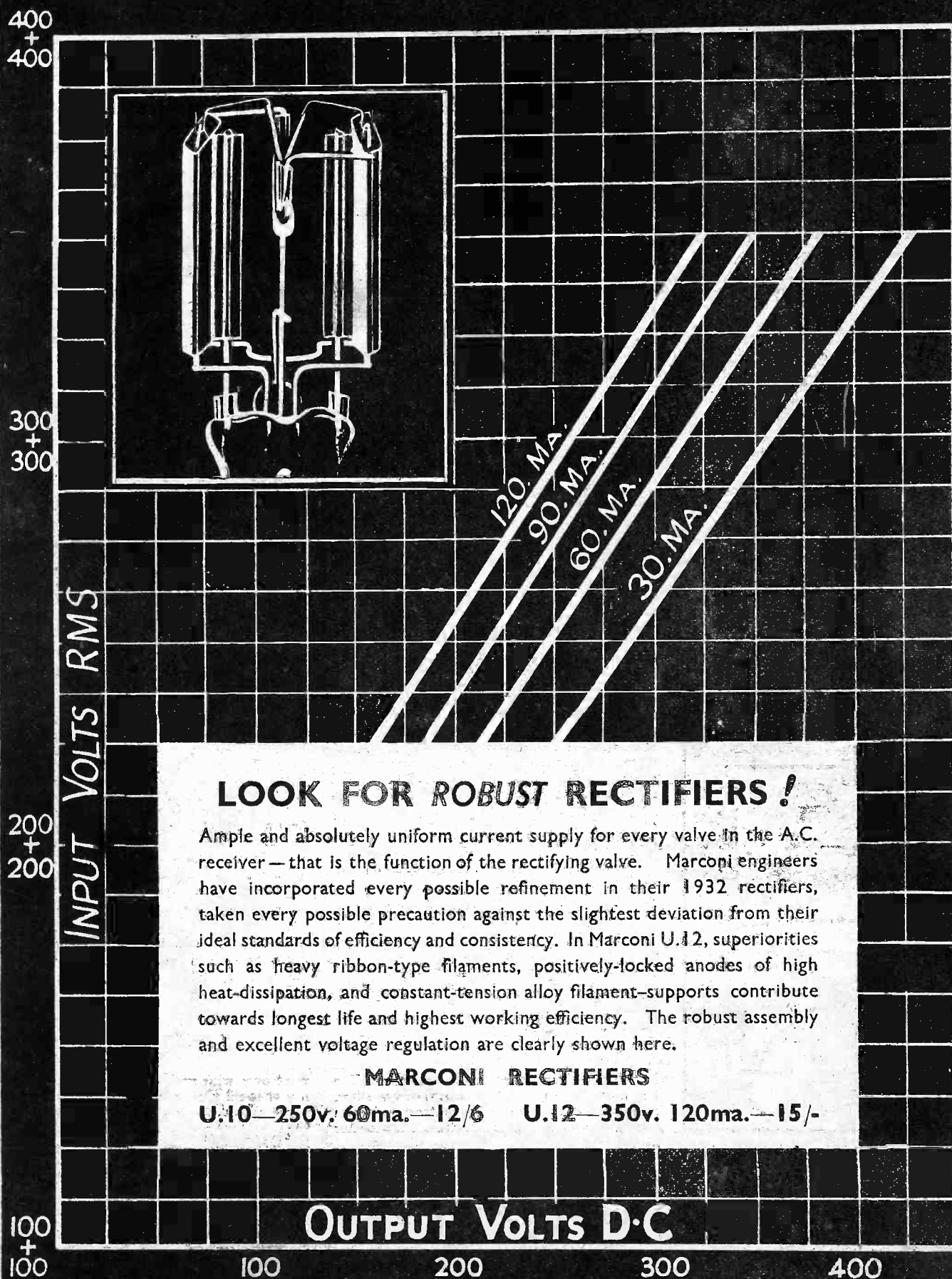
It is, in fact, a first-class speaker, sensitive, clear and full-toned and one which you can use with excellent effect with any class of set.

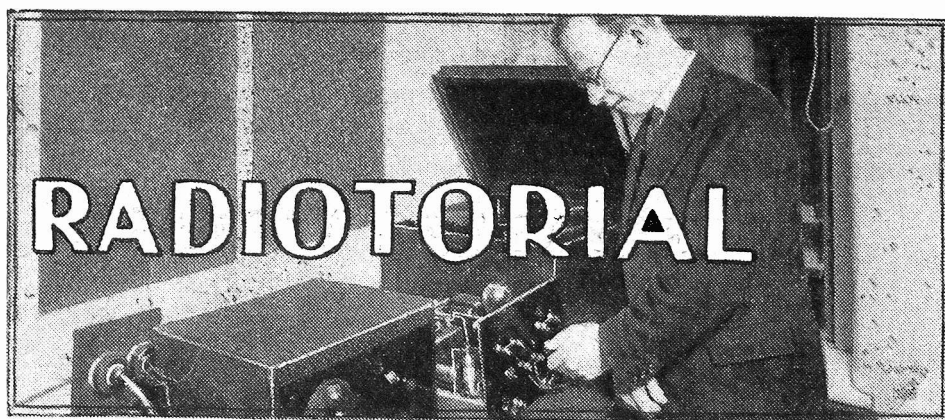
## AN EXCELLENT INDUCTOR SPEAKER



The 100D Blue Spot Inductor Speaker and a Blue Spot Inductor Unit.







All Editorial communications should 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 or 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. Lile, 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 reception. 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 specialties described may be the subjects 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

### CUTTING OUT THE SCRATCH.

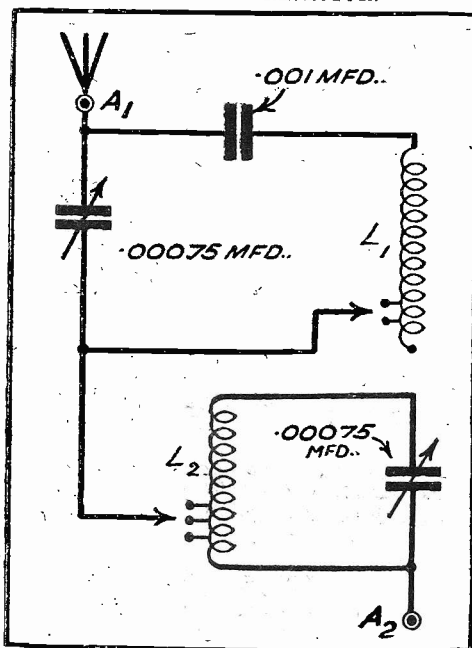
A. D. (Watford).—"The only fault I have to find is that when switched over to gramophone I get rather a lot of scratch in the background. I think it is due to the particular pick-up I use, as the only other case I know where a similar result is obtained is in that of an acquaintance of a friend of mine who uses

In all probability the high resistance was connected across the terminals of the pick-up in order to flatten the response and make it less peaky, and any form of good quality high resistance will be O.K. for this. The most satisfactory value will depend upon the pick-up in question, but will probably be round about the 50,000 to 100,000-ohms mark.

A potentiometer of this value, with its slider connected to one side and one end to the other side of the pick-up, is just the thing, and it could be adjusted to give the best results in a moment. As it is improbable that the resistance value will be found critical, you would probably notice an improvement if you connected any high resistance, such as a spaghetti of about the values mentioned, across the terminals.

If it is then found that only certain records give trouble, you can easily wire an on-off switch in series with it, so that it could be cut out of circuit in a moment when it was not necessary.

### MISSING LINKS, No. 32 BROOKMANS REJECTOR.



Last week we gave only the "components" for a Brookmans Rejector, and above these are shown "wired up" into a complete circuit.

DID YOU GET THE WIRING RIGHT?

exactly the same make as mine, and also gets a little too much scratching noise.

"I am told that in his case it was overcome by a resistance of the anode-resistance type, this being connected to the pick-up, and I should like to try this if you can give me the connections."

### AN EXPENSIVE EXPERIMENT.

"FIREWORKS" (Ipswich).—"Being an ardent experimenter, I have more than once had some spectacular fireworks to deal with when playing about with circuits, but I generally find the lesson is well worth the cost. My latest adventure has cost me a milliammeter, and I am still wondering how! So I should be glad if you could explain to me just why it blew up."

"I am using a full-wave rectifying valve in conjunction with a home-made mains unit, and the usual smoothing, consisting of two

although I switched off instantly, the damage was done, and the milliammeter is still showing 50 milliamps!

"Could you tell me why such a big current should flow, as apparently the connections were quite O.K. and nothing shorting anywhere? After taking the milliammeter out, I joined up the lead to the centre of the transformer again and switched on, when the set went just as before."

"I must say I was rather surprised at this, for I thought that some sort of shorting trouble had developed when the milliammeter needle

### "P.W." PANEL, No. 68. USING A.C. VALVES.

When using the 5-pin type A.C. valves it is necessary to be particularly careful in wiring the valve holders.

Before they are fixed make sure that all the nuts are tight, as the multiplicity of leads makes it almost impossible to tighten a loose terminal on such a valve holder once it is in position.

Metal baseboards are often used with this type of valve, and it is advisable to place a piece of stout cardboard or other insulator under the valve holder to prevent accidental "shorts."

Also be careful that neither the soldering tags nor "whiskers" on the connecting leads can bend down and touch the metal baseboard.

large chokes and three large condensers. The two large chokes are in series with one another, and one is connected to the centre tapping on the filament point of the rectifier transformer in the usual way.

"One condenser goes also to this point, another condenser to the junction between the two chokes, and the third to the other side of the remaining choke. The three other terminals on the condensers are joined together and taken to the centre tapping on the high-tension winding of the transformer."

"I should explain that normally the unit delivers 30 milliamps, but lately it has seemed noisy, and I had an idea that one of the large smoothing condensers had broken down."

"With the milliammeter connected in the

went over with such a bang. I should be glad if you could give some explanation for this."

The explanation is that your smoothing chokes and condensers really do smooth the current. If the unit is to deliver a steady 30 milliamps direct current and its input is not direct, it is quite obvious that during the time the input current is flowing it must be greatly in excess of 30 milliamps in order to make up for the time when it is not working. In short, in order to get 30 milliamps delivered steadily from the output, the intermittent input current must be very much larger during those moments when it flows.

And, quite apart from this question of an average output requiring high value intermittent input, there is the more important charging effect of the condensers to be considered. It will be obvious that if, when normally working, the instantaneous input current values are higher than the average output values, they will be enormously greater at moments when the unit is first switched on.

(Continued on page 200.)

### HOW ARE YOUR RESULTS NOW?

Perhaps the switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly?

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 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.

**LONDON READERS, PLEASE NOTE:** Inquiries should NOT be made by phone or in person at Fleetway House, or Tallis House.



# B.I. ENAMEL COVERED WIRES

B.I. Enamelled wires are unequalled for the field windings of small motors, measuring instruments, radio transformers, and other pieces of electrical apparatus where space is all-important. They are produced throughout in our own works, from the raw material to the finished wire, and every phase of manufacture is under the strictest control as regards quality of material and accuracy of gauge. B.I. Enamelled Wire is unexcelled for its high insulation, dielectric strength, flexibility of enamel, and general dependability. We regularly manufacture Enamelled wire as fine as '002" dia.



**BRITISH INSULATED CABLES**

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# A DUBILIER CONDENSER

at

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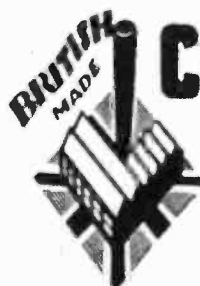


The Dubilier Condenser Type 85 is a highly efficient moulded mica condenser designed for use where lightness and compactness are of vital importance.

## PRICES

.0001 mfd. . . 6d.  
.0002 mfd. . . 6d.  
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# MEANS YOU NEED NEVER TAKE RISKS WITH YOUR CONDENSERS AGAIN!



**DUBILIER CONDENSER CO. (1925) LTD.**

Dacon Works, Victoria Road, North Acton, W.3

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 198.)

At the moment of switching on you had the three large condensers, amounting to perhaps 6 or 12 mfd. capacity, across the rectifier, each taking a large current. When joined thus in parallel the three take an enormous current momentarily until they are charged.

Even if the milliammeter had been connected to the output lead of the rectifier, instead of the input, it might have had a sudden rush of charging current to contend with, when the by-pass condensers in the receiver were being charged at the moment of switching on: but this would be absolutely trivial compared with the large current which would flow from the actual rectifier to the smoothing circuit, with its very much larger condensers, and it was the large charging currents to these that "blew" your milliammeter.

### MODERATING THE "COMET" III.

The number of readers asking for particulars of the re-wiring of the "Comet" Three to include a Moderator is so great that the best way to reply to them is to take a typical instance and describe the whole process minutely enough to satisfy all enquirers.

We will suppose then, that you have your "Comet" Three in front of you, constructed exactly as per the blueprint that was given away with "P.W." The set is out of its cabinet, and has its back turned towards you, so you are looking straight at the "P.W." Dual-Range Coil.

One of its terminals (right) is marked S1, and is connected to a .002 mfd. condenser, to the moving vanes of the tuning condenser, and to one contact on the wave-change switch.

The first thing to do is to undo S1. But leave the two condensers and the wave-change switch still connected together.

Then run a shortish flex lead from that terminal of the .002 mfd. condenser which was formerly connected to S1, to the terminal on the Moderator coil which is joined to one end of its winding.

And to this same end of the Moderator winding, run a lead to one side of the Moderator condenser.

(We are assuming that you will mount this condenser just beside, or above the wave-change switch on the panel, where it will most conveniently be handled.)

Now join S1 terminal on the dual-range coil to the other end of the Moderator coil (flex tapping terminal), and to the other side of the Moderator condenser.

Then carry on as explained in the articles on Moderating, varying the tap and the position of the Moderator coil until you have found the best place to stand it relative to the dual-range coil. Try the effect of the alterations on long waves, as well as on the medium waves, and also try the effect of "unplugging" the Moderator tapping altogether on long waves, as well as varying it from one tapping to another.

Don't forget to disconnect your batteries before starting on any of the alterations, and be careful not to damage the other wiring in your anxiety to get the moderator going.

### "MODERATING" REPLIES IN BRIEF.

W. B. (Faversham).—The "Comet" Two is moderated in the same way as the "Comet" Three. (See reply above for details of this.)

\* \* \*

T. A. J. (Ramsgate).—It is better to connect the aerial to A on the unit, and then moderate, as is explained above.

\* \* \*

A. E. W. (Bermondsey).—See answer to other correspondents in Radiatorial columns for the method of connecting to S1. You should retain plenty of the volume and get adequate selectivity as well by experimenting carefully with the position of the Moderator coil.

## WIRELESS IN WAR-TIME

(Continued from page 185.)

"My God!" he said. "What was that, T—?" (T— is our First Mate.)

"Lord only knows," said T—, with chattering teeth: "Sounded as if some fool had fallen overboard."

Presently the Chief Engineer, one of the stewards, and the Second Mate came running up. It appears that I had been heard nearly all over the ship. Anyway, they started a search, but when they looked in my room I produced an excellent snore and they retired. When I told them all about it this morning they laughed heartily.

Here is another incident. This boat being an oil tanker, it contains some huge cylinders, which are at present empty. One of the men was cleaning one of these cylinders this morning but somehow dropped a

## TECHNICAL TWISTERS

### No. 110.—TRICKLE CHARGING.

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The trickle charge differs from ordinary battery charging chiefly in two respects—the duration of the charge is much . . . . . and the charging rate much . . . . .

\* \* \*

The method enables the battery to be . . . . . in good condition by daily replenishing the overnight losses.

\* \* \*

If the battery is in good condition when installed it need never . . . . . but can be kept in tip-top condition by regular . . . . .

Last week's missing words (in order) were: Advantages, Matching, Steady, Matching, Choke, Transformer, Ratio, Assist.

pail. The effect produced was a noise like ten thousand thunder-claps.

From out of the stokehole door a dozen or so inky black figures came scurrying like frightened rabbits, all pretty white beneath the dirt. Old T—, who had stepped into the wireless cabin to light his pipe and have a chat with me, jumped up with an oath.

"Hell's flames!" he cried. "The swine have got us!"

And I must say it sounded like it. It gave me quite a scare. But after the Mate and the stokers had given the unfortunate fellow who had caused the disturbance their opinion of him—and couched in no uncertain terms—and had finally reduced him to a state of cowering imbecility, we all sobered down. But everybody's temper is a bit raw, and later on, when one of the crew interviewed old T— and complained about the food, old T— replied with a snort:

"Look here, if the meat is good enough for us, it's good enough for the likes of you. Some of you — chaps wouldn't be satisfied with the baked wing of a — angel!"

One can't help laughing.

## MIRROR OF THE B.B.C.

(Continued from page 188.)

beginning of this month went off without any more trouble than one expects from such upheavals in the routine life of people accustomed to finding things in the morning as they left them overnight.

This was mainly because the majority of the staff found conditions at Broadcasting House rather better than they had been led to believe would be the case by the people connected with other departments of the Corporation who had already been in their new quarters at Langham Place for some months and who on their visits to Savoy Hill told tales of filth and dirt in the offices and chaos caused by workmen swarming about the half-finished building.

### Interior Work Nearly Completed.

There is no doubt that the earliest arrivals at Broadcasting House did have a particularly rough time, what with the noise and disturbance created by the hundreds of men engaged on getting the interior of the building ready for occupation, but most of this work had been finished before the end of March.

Some amount of hammering and banging will go on for a long time yet, but this will be no worse than the noise of the pneumatic riveters to which the staff had to listen for some months while at Savoy Hill during the erection of the new Shell-Mex building on the Hotel Cecil site, and the big block of offices now nearing completion in Savoy Street and Waterloo Place.

Generally speaking, therefore, Broadcasting House has turned out to be rather better than most people anticipated, which is decidedly beneficial for the morale of the staff, who shouldered many little inconveniences like good scouts.

I happened to be at Savoy Hill when preparations were being made for the move, and saw what was going on in several rooms. All papers and documents were being carefully looked over and tied into neat bundles ready for placing into hundreds of chests bearing numbered labels of the rooms to which they were to be deposited at Broadcasting House.

### How the Move Was Made.

Such a clean up is very desirable at times because it provides a glorious opportunity of getting rid of so much unnecessary and unwanted stuff which would otherwise be retained.

All furniture and other fittings were numbered in the same way, and then, when everybody had gone home, expert removers with a fleet of motor-vans made many journeys between the Strand and Langham Place.

Monday morning found everybody concerned in good humour and early in their new rooms at Broadcasting House, tackling the task of unpacking and getting straight. In most instances the rooms had already been got into ship-shape order by the cleaning staff, and within a few days work was going on more or less normally.

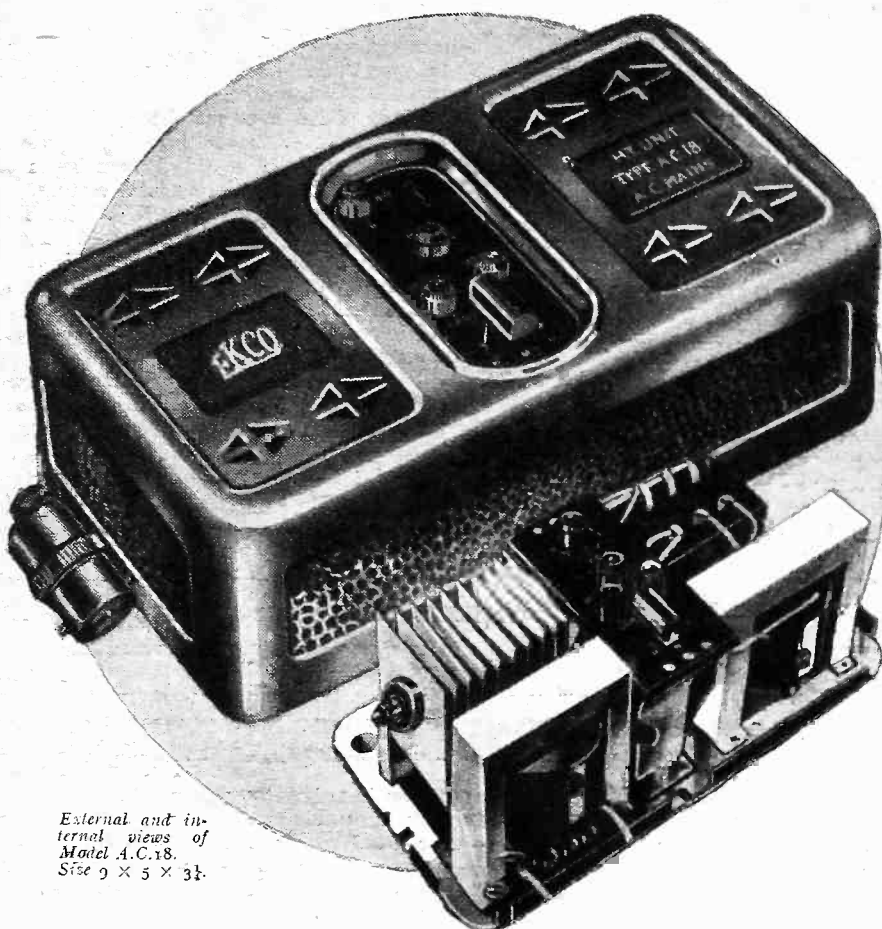
Several departments and sections, including the Director-General's, the Controller's, part of Major Gladstone Murray's, and the whole of the Finance and Music departments' staffs have still to move, but the biggest part of the job is done, and those

(Continued on page 202.)



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**EKCO**  
**POWER UNITS**

## MIRROR OF THE B.B.C.

(Continued from page 200.)

who remain at Savoy Hill will not all be moved at one time.

Much has still to be done before the twenty odd studios with their waiting and audition rooms are ready for use, but work is proceeding rapidly, and in some future issues I shall have a good deal to say about the progress of the work and about Broadcasting House and what goes on there.

Broadcasting House will not, as some people imagine, accommodate the whole of the B.B.C. staff, even though it will obviate the necessity of renting so many outside premises as was the case up to about six months ago.

## Outside Accommodation Still Required.

The big Engineering and Research and Workshop staffs, about seventy in number, under the control of Mr. Kirke and Mr. Dimmock, at Avenue House, Clapham, will remain, because there is no place in the heart of London where tests and experiments, and the manufacture of apparatus for the various Regional transmitting stations and the outside broadcast department can be carried out.

But now I hear that Avenue House is too small for the requirements of the B.B.C. and that there is every likelihood of moving the Engineering Research Department to more suitable premises. Negotiations have been going on for the purchase of a large house, not a long way from Avenue House, for the purpose, and I should not be at all surprised if the deal has gone through by the time these notes appear.

## THE LISTENER'S NOTEBOOK

(Continued from page 188.)

this country of the pig-rearing industry as a result. One thing is certain, however, viz.—his talk will cause some heart-flutterings in Danish pig-rearing circles.

One thing I like about Mr. Ernest Newman is that he is one of the few broadcasting critics who do really criticise—and this he does relentlessly yet kindly. His recent criticism on the Haydn Bi-centenary celebrations must have found favour with a large number of music-lovers anxious to hear some of the composer's less familiar works. One hopes his remarks reached the ears of those responsible for the arrangement of future celebrations of this nature.

I was particularly interested in what he had to say about the possibilities of the player-piano. True, this instrument wasn't given a fair trial with Mendelssohn's Capriccio Brillante, but even with some really pianistic music, as Mr. Newman suggested, I doubt whether Mr. Reginald Reynolds will ever be a serious rival to Christopher Stone, as was predicted by a certain wireless correspondent.

## A Busy Thirty Minutes.

What a tremendous amount Dr. John Baker crowded into his thirty minutes! Even to those who do not profess the smallest interest in the blackbird or the house-sparrow, he must have been very entertaining. He seemed to me to possess a most enviable sense of humour. I wished his talk had been longer.

I would urge Mr. Gerald Barry to use his waste-paper basket more, and pay no attention whatever to correspondents who ask him, at this late hour of the day, to explain why people are selling golden sovereigns, and what happens to these sovereigns after they are sold.

Haven't our newspapers already dealt exhaustively with these questions, and isn't the news stale now? As a matter of fact, I thought that the whole of Mr. Barry's talk was just a re-hash of stale newspaper matter.

## Talks Deteriorating.

I recently expressed a preference for talks, but please don't imagine that all talks meet with my approval. They don't. I think certain of them should never be sent out at all. Mr. C. Lowe's Dickinson's talk on "Goethe" illustrates my point. It would be interesting to know what percentage of listeners sat through this particular talk. A mere handful, I guess. How many listeners didn't even begin to listen in? The majority, I'm certain.

If I am right, then is the B.B.C. justified in catering for the mere handful? I say *not*, for the simple reason that this mere handful can find all Mr. Dickinson has to say in their introduction to any good edition of Goethe's "Faust," and they would doubtless all possess such an edition.

Mr. Dickinson's talk smacked too much of the Varsity lecture, and it was delivered quite in the manner of the Varsity lecturer. The average listener cannot be expected to accept this as entertainment. If it is intended as instruction, then the dry-as-dust manner of the Varsity don must be dropped.



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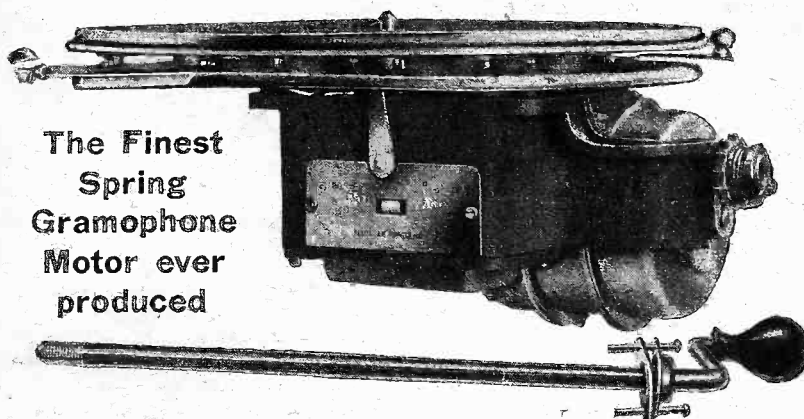
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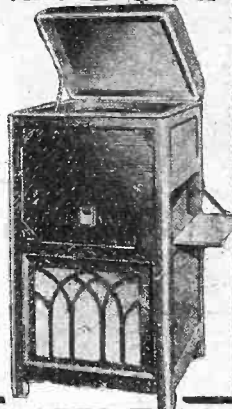
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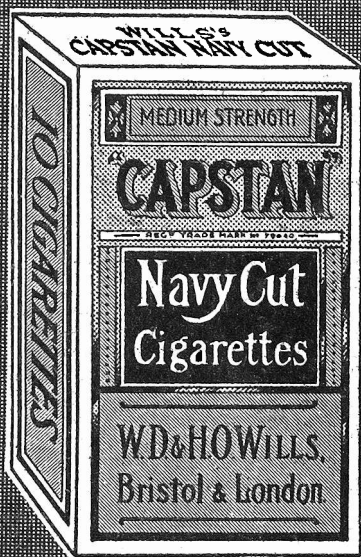
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## TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

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

### Using a Milliammeter.

I wonder how many readers use a milliammeter for checking over valve currents? It is a very handy instrument, because you can very quickly tell whether the valves are taking their proper currents and whether the grid-bias and screen-grid voltage are having their proper effect.

If you use a milliammeter in the anode circuit of the last valve, you can quite easily know whether overloading is taking place owing to incorrect grid bias being used, such overloading naturally giving rise to distortion. This is perhaps the best known and simplest use for the milliammeter in checking over the receiving circuit, and for this purpose the instrument should be connected between the high-tension supply and the anode circuit of the valve.

When signals are being received you will notice that the instrument will give little erratic kicks; these can be smoothed out, or practically so, by various adjustments to the set.

### Too Much Grid Bias.

Too much grid bias generally shows itself by a movement of the needle further across the scale when signals are tuned in. The bias should then be reduced, and the needle will go back to a lower position and will not be so unsteady. If the valve is being overloaded you will notice that the needle will kick very distinctly on stronger notes.

From the above you will see also that if the grid bias is much too low, the needle will tend to return towards the zero position.

### Indications of Distortion.

As an indicator of overloading and of the conditions leading to distortion the milliammeter in the anode circuit, as mentioned above, is particularly useful, and it helps you very much in getting the grid bias adjusted to the best value. Quite a good milliammeter can now be obtained very cheaply and it is a very good investment, as not only can it be used in the way indicated above, but also it comes in handy in a variety of other ways, especially if you go in much for the rigging up of experimental circuit layouts.

For one thing the instrument can be used with the detector, in which case it will give indications of the strength of signals. If you are using a grid-leak detector arrangement the reading on the meter will decrease as signals are tuned in. In fact, the high-frequency amplifier can be adjusted and the effect of the various adjustments can be noted by the meter when you would not be able to observe any difference in the output if you relied upon the ear alone.

### Useful in Ganged Circuits.

The rectified anode current in the detector circuit will vary according to the screen-grid and grid-bias voltages used, and if a

milliammeter is in circuit these effects can be instantly noted. In the same way, when ganging up a set, a meter is particularly useful, as the tuning will, of course, depend upon the ganging, and will at the same time influence the reading of the meter so that the accuracy of the ganging is reflected in the readings on the instrument.

Some instruments have only a single range, whilst others have two or three ranges, these latter being, of course, more useful. Personally, I use a number of different instruments, but this is more expensive, and the multi-range instrument is usually quite satisfactory for most ordinary purposes.

One of my instruments reads up to 30 milliamps on each side of zero, whilst another has a range of 0 to 5 milliamps, and another, which is particularly useful for such purposes as those mentioned above, has a total scale reading from 0 to 2½ milliamps.

### Amplification Factor and Impedance.

I said something recently in these Notes about amplification factor and impedance. Many amateurs think that the total magnification which is obtainable should be proportional to the amplification factor of the valve. This is not surprising because, after all, to the average person the phrase "amplification factor" means what it seems to say, and that is, a simple measure of the total amplification obtainable.

The fact is, however, that the magnification depends not simply upon the particular factor defined as the amplification factor, but upon a number of others as well, of which the most important is the impedance. The impedance, in fact, is quite as important as the amplification factor.

Then you might think that if you had two valves of the same impedance but of different amplification factors, the one with the greater amplification factor would give the greatest overall magnification. If the two valves were used alternately in the detector position it is probable that the above would be true, but there are some cases where it would not be true. For instance, in a screen-grid stage, of two valves otherwise equal, but one having a greater amplification factor, the latter would quite possibly give inferior results to the former owing, for instance, to the circuit being rendered unstable.

If instability set in, it would complicate the tuning, and in order to get out of these difficulties you might reduce the screen-grid voltage so as to bring back stability, but then the total amplification might, as I say, be no more than (or even less than) that which you would obtain with the other valve. Not only this, but with a correspondingly reduced grid-bias voltage you might also have overloading and distortion.

### Interchanging Valves.

This touches on a question which is very commonly asked, especially by beginners, because you would certainly think that by substituting a valve of greater specified amplification factor for a valve which you were previously using, you ought to get better overall results. What I have said above only goes to show that there are many factors involved in the performance of a valve in any particular conditions, and as a rule, if you have a valve which is really working efficiently, it is better to leave well alone.

(Continued on next page.)



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## TECHNICAL NOTES

(Continued from previous page.)

If you substitute another valve you may start hares running in all directions and give yourself a lot of trouble in getting back to results as good as those you had at first.

### Anode-Bend Detection.

Talking about valve impedances, by the way, I dare say you know that when a valve is used for anode-bend detection the impedance of the valve is often greater than the specified value owing, of course, to the different conditions in which it is used. The specified impedance is often taken at zero grid bias at a standard H.T. voltage of, say, 100 volts.

When the valve is used for anode-bend detection it has a negative bias applied, and the result of this is that the working point of the valve is moved towards the lower curved part of the characteristic curve. The impedance nevertheless is, as I say, greater than the specified value, and it is therefore important when considering the use of a particular valve for anode-bend detection to have in mind very carefully the type of coupling which will be used with it.

For instance, a different type of valve will be needed for transformer coupling from that required with resistance-capacity coupling. If a valve has a fairly low impedance transformer-coupling will probably be quite satisfactory, but if the impedance of the valve is high, it may be preferable to use a resistance coupling.

### New Accumulators for Old.

When an accumulator has been in use for a fairly long time, say two or three years, it generally begins to shed the paste, and this falls into the "mud space" at the bottom. But sometimes particles of the paste will get wedged between the plates and short-circuit them—or, at any rate, partially short-circuit them—so that the battery soon loses its charge.

I had a lot of trouble recently with a motor-car battery from exactly this cause, and it was only after several "cleanings out" of the battery with distilled water that I succeeded in getting it into proper working order again.

With a radio battery contained in a celluloid case it is a comparatively simple matter to see whether any particles are lodged between the plates, and so far as the mud and fine grains are concerned you can get these out—with a certain amount of trouble—by repeatedly washing out the cell and draining the water through the vent at the top.

A reader, however, sends me a hint which seems to me quite a good one if properly carried out.

### Cleaning Out the Cells.

He says that he had a very troublesome accumulator and the only way in which he could get it right was to cut a hole, about half an inch in diameter, in the bottom of the case and then to flush the whole accumulator thoroughly by means of a piece of hosepipe pushed over the top vent, the water flushing between the plates and coming out at the hole at the bottom.

When the cell had been finally freed of all particles between the plates and had

(Continued on next page.)

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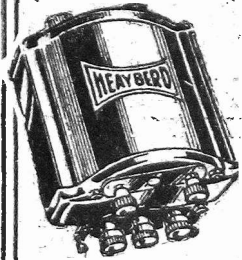
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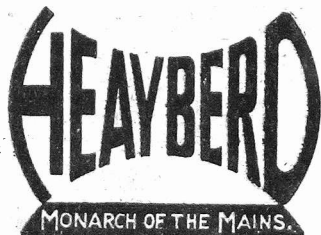
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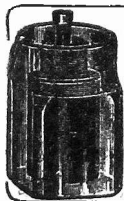
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## TECHNICAL NOTES

(Continued from previous page.)

then been well rinsed with distilled water, it was stood upside down and wiped and then left until the celluloid was perfectly dry. A circular patch of celluloid sheet about the size of a shilling was then carefully cemented on by means of celluloid cement so as to cover up the hole.

This was left twenty-four hours to make absolutely certain that it was secure, and then the cell was filled up with acid again and put into service.

### Repairing the Cell.

This strikes me as quite a good scheme, and the only really vital point is to make sure that the patch is thoroughly cemented over the hole when the cleaning operation is complete. By the way, unless the celluloid in the region of the hole and also the patch are thoroughly dry before commencing operations, you will not succeed in getting a good mend.

Some of you may think that this is rather drastic treatment, but remember that when a cell has got to the stage of shedding its paste freely and getting particles lodged between the plates, it is pretty well on its last legs anyhow, whereas by the above-mentioned dodge, drastic as it may seem, you have at any rate the chance of giving the cell another year of more or useful life.

### Attention to Details.

The detector is the most vital point of the whole of the receiving circuit, and I think many of us are sometimes apt to overlook this. We do not, I think, always give sufficient care to adjusting the values, grid bias, grid condenser, reaction, and so on, as we might do; extra care in these particulars will well repay the trouble involved.

When you come to think of it, the detector valve in the receiver has quite a good deal to do, as it is handling both high-frequency and low-frequency currents at the same time.

The grid circuit of the detector receives modulated high-frequency signals either direct from the aerial or after amplification by high-frequency stages. In the anode circuit is a low-frequency transformer or some other form of coupling for transmitting the low-frequency signal to the next valve. The anode circuit also carries high-frequency currents.

### A Ticklish Stage.

It is clear that if we vary the value of any part for some particular purpose, for example in order to improve quality, we most probably will affect at the same time other factors, such as the strength of the signals, the smoothness of the reaction or what not. The detector stage is, therefore, as I say, not only the most important but probably also the most ticklish of all the stages in the receiver.

Inasmuch as there are so many factors to be considered, the variation of any one of which immediately involves all the rest, you will see how important it is to spend very special care upon the correct adjustment of this stage. The detector stage, in fact, is really doing a multiple and very complicated job, and you mustn't be surprised if it squeals (metaphorically, if not literally) when you ask it to perform impossibilities.

### Using a Metal Baseboard.

When making up a set on a metal base, or upon a baseboard covered with a metal sheet, it is pretty obvious that special care must be taken to avoid any short-circuits or accidental contacts. But it is surprising how easy it is to make an accidental contact without knowing it, and really you should take extra special care to examine every component which you fit on to the metal base so as to make sure that there is proper clearance between all the parts.

I have seen a valve holder mounted on a metal base, the holder itself being quite clear, but when the valve was pushed into position the valve pins went right down and one or more of them touched the metal. The terminals fitted in the base of a tuning coil or a choke or transformer may very easily make contact with the metal sheet, and all these parts should be very carefully examined to make sure that terminals are properly countersunk in the components so as to be clear of the metal base.

One way, of course, is to cover the metal sheet with a further sheet of thin plywood or even a thinner sheet of insulating fibre; but although this simplifies the problem a good deal, it still remains to be very careful what you are doing with such a lot of contacts and such a large amount of metal close at hand. Incidentally, it is always a good plan, and particularly in the case mentioned above, to fit a fuse, of the flash-lamp or some other type, and to be sure

## NEXT WEEK SOME "COSMIC" POINTERS

the fuse has a sufficiently low current rating to be an adequate precaution for the set.

### Television Progress.

Several of the big electrical concerns in the United States either have already, or have applied for, experimental licences for television. I see that television in the home, according to many well-known American engineers, is reckoned to be at least three, if not five years in the future, whilst some even go so far as to put the time when television will be in any sense a useful, practical home entertainment as far as ten years ahead.

The television licences granted by the Radio Commission are on an experimental and temporary basis. This, I understand, is because, whilst the Commission thinks that experiments in television should be encouraged, they do not see their way to grant a permanent licence which would be based upon "public interest, convenience or necessity."

Incidentally, notwithstanding the experimental work which is going on in the United States, I see that Dr. Colpitts, a very well-known American radio engineer, in a public lecture upon probable developments in the radio and electrical field, did not introduce the subject of television. From this it is presumable that he does not regard television as likely to be a practical proposition for a long time ahead.



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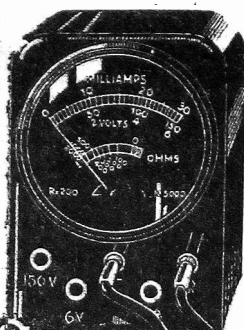
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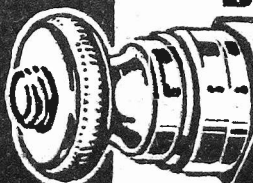
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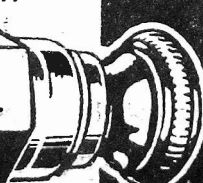
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## The "Vi-King" Super

This is the first super-heterodyne receiver to be described for home-construction by Victor King, whose receiver designs are always extremely popular. He has some important things to say about super-hets, which will appeal to all readers, whether or not they are interested in building this particular set.

## The "Pentode" Two

With its fine tone, ample volume, simple operation and low cost, this two-valver constitutes an ideal receiver for anyone who does not want or cannot at the moment afford an elaborate outfit. It has two-band tuning, and although it uses only two valves it by no means confines reception to the local or home stations.

*Remember also that—*

# JOHN SCOTT-TAGGART, F.Inst.P.

WRITES EXCLUSIVELY FOR "THE WIRELESS CONSTRUCTOR"

and in this number contributes:—

## FROM MY ARMCHAIR

Among the diverse topics discussed by "S.T." in this informal chat are queries raised by readers about reception, hints on aeriels, and notes on choosing a mains unit.

## DECOUPLING SIMPLY EXPLAINED

Many listeners must have wondered why decoupling is so essential in a multi-valve receiver, how it works, and what makes the set start "motor-boating" if decoupling is omitted. In this article Mr. Scott-Taggart tells the whole story in easy-to-understand language.

INCLUDED WITH MANY OTHER FEATURES IN THE MAY NUMBER ARE:—

Shall I Design a Portable ?  
Round the Dials  
The Month on Short Waves  
Queer Queries  
Pick-up Hints and Tips

Making Tuning Readable  
With Pick-up and Speaker  
Wireless Woodwork  
Where to See the S.T.300.  
A Practical Man's Corner

etc., etc.

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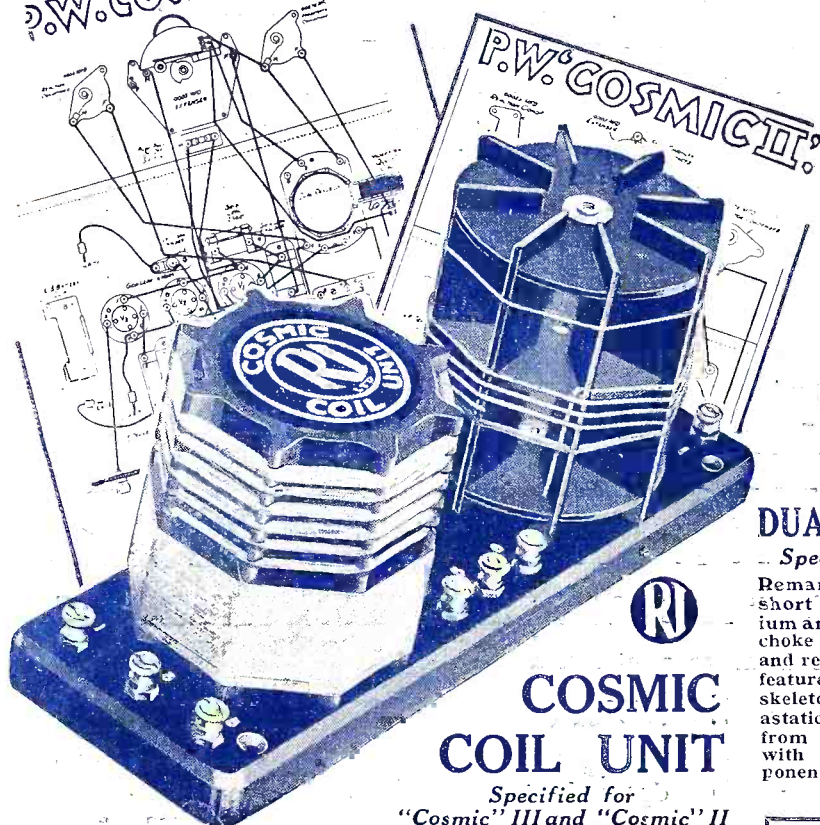
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P.W. COSMIC III



## COSMIC COIL UNIT

Specified for "Cosmic" III and "Cosmic" II

This component combines in one complete unit, coils for long, medium and short waves, ensuring easiest fixing and most compact set assembly. A fact of paramount importance is the skeleton construction of the short-wave coil former, which reduces dielectric losses to a minimum—a vital point in these circuits. Every individual coil is carefully tested, before release, on the "Cosmic" III circuit, and checked with a wavemeter over the entire range of broadcast and short-wave bands. List No. BY 31

12/6

P.W. COSMIC II



## The HYPERMITE Transformer

Specified for "Cosmic" II

Possesses a high permeability core of "Nickalloy" and gives therefore great and uniform amplification—requisite to the fineness of reception for which this circuit was designed. "Hypermite" was the first popular priced Nickel-iron alloy core transformer, and is chosen by more experienced set builders for best results.

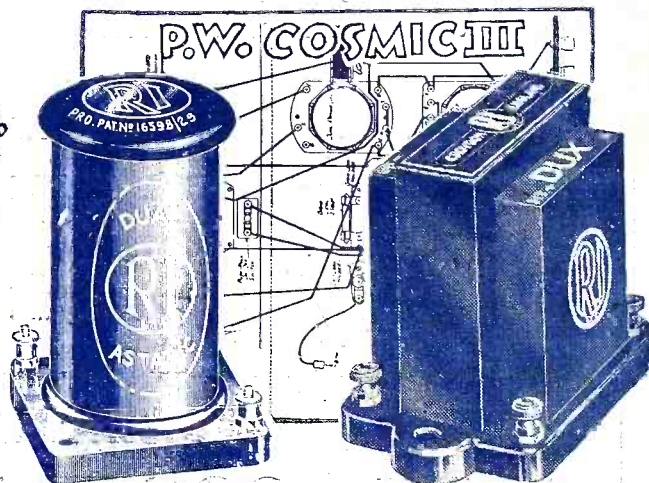
Inductance 50 henries.

Ratio 3½ to 1.

Dimensions Overall: 2½ x 1½ x 2½ ins. high

Weight 7 ozs.

12/6



## DUAL ASTATIC CHOKE

Specified for "Cosmic" III

Remarkably efficient on the short waves as well as the medium and long waves this is the only choke that cuts out all blind spots and resonant losses—an important feature for short wave work. Its skeleton form of construction and astatic winding ensure freedom from H.F. interference with adjacent components.

List No. FY 1

7/6

## "DUX" Transformer

Specified for "Cosmic" III

This remarkable Transformer has attained enormous popularity by unequalled performance in hundreds of thousands of sets, and is the designers' first selection for the "Cosmic" III, because it is without doubt the lowest priced transformer that is really efficient and which gives the good L.F. amplification, so vital a feature in the circuit.

Inductance 30 henries.

List No. DY 29

6/9

Ask your dealer, or us, for the new R.I. Catalogue and the Special Leaflets dealing with "Dux" Audirad Choke and other R.I. Components.

## "DUX" Audirad Choke

Specified for "Eckersley A.C.2."

A new form of choke dealing with low frequencies and high frequencies by means of a unique stopping device which bars H.F. currents that would normally be passed by the self capacity of an ordinary L.F. choke, and cause hum and other H.F. interference. Its super-efficiency for smoothing or output filtering in A.C. circuits is the reason for its specification in the "Eckersley A.C.2."

8/9



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T.A.