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# Popular Wireless

## and Wireless Review

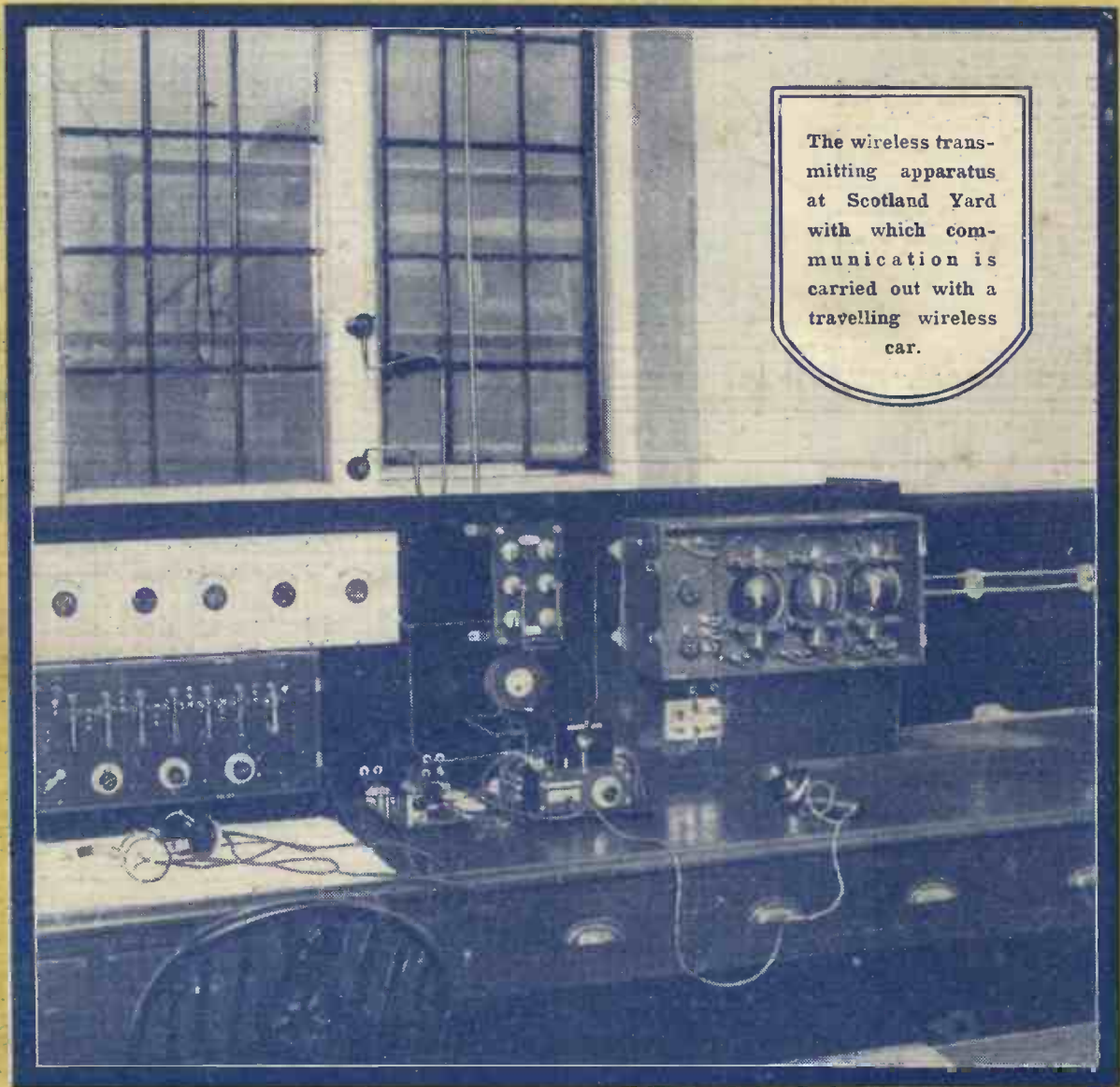
PRICE 3d.

EVERY FRIDAY.

No. 97. Vol. V.

SCIENTIFIC ADVISER : SIR OLIVER LODGE. F.R.S., D.Sc.

April 5th, 1924.



The wireless transmitting apparatus at Scotland Yard with which communication is carried out with a travelling wireless car.

### FEATURES IN THIS ISSUE.

An Interesting B.B.C. Experiment  
Developments in Dull Emitters.  
Wireless in Australia.

The Control of Grid Potential.  
KDKA on One Valve.  
A Useful Four-Valve Set.

The "P.W." Long-Range Broadcast Receiver with Variometer Tuning.



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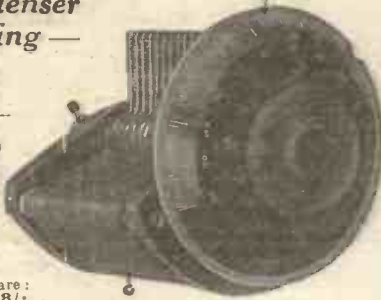
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- A. Aluminium Screening Disc, which besides enhancing the appearance of the dial as it lies flush with the panel, prevents the hand of the operator producing capacity.
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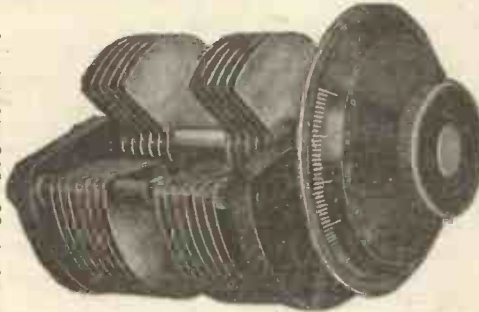
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was the first popularly priced Twin Condenser placed on the market. Enormous demands and sales have enabled us to greatly reduce the price. There are many imitators but there are no superiors. Amateurs now receiving America every night in the week with the "Duanode." In a recent article in "Modern Wireless" on the subject Mr. Percy Harris gave very favourable reference to the "Duanode."

The "Duanode" consists of Two matched condensers operated by one knob, thus by using matched COILS it is possible to tune BOTH Circuits perfectly with one operation only. If any difficulty is experienced in matching the coils they may be roughly matched and a vernier Condenser connected in parallel with the smaller. The two sets of Fixed Vanes are carefully insulated one from the other, and the moving vanes connected electrically. The spindle can thus be connected to H.T. Positive. This Condenser can be used for other purposes. The two halves (each of .00025 mfd.) can be used in series or parallel, giving capacities of .000125, .00025 and .0005. Reduced Price now only 17/6



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It is ideal for long-range reception.

It does not fade, and is unaffected by temperature—the melting temperature even of common solder does no harm to "TUNGSTALITE."

## A REMARKABLE PERFORMANCE

March 17th, 1924.

11, Nelson Road, Gourook.

Dear Sirs,—Herewith my report and test on Tungstalite supplied to me on Thursday last. The signals were very loud and clear, no fading, and all parts of crystal were "lively." The chief point to be aimed at is very light contact between crystal and whisker (which I note you mention).

I am using an ordinary set of basket type coil with variometer tuning. Glasgow station is about 23 miles distant. On Saturday evening I picked up Aberdeen—distance about 100 miles—during the interval of Glasgow's programme, loud enough to distinguish a lady's voice singing, and later orchestra.

In conclusion, my opinion is they are the best crystals I have used (which are not few) and am pleased to recommend them whenever opportunity arises, or give a practical demonstration to anyone interested.

Faithfully yours, W. F. PINNEY, Radio Society, Gourook.

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# TRY — A — TUBE — TO-DAY



# POPULAR WIRELESS

AND WIRELESS REVIEW.

April 5th, 1924.] THE RADIO WEEKLY WITH THE LARGEST CIRCULATION. [Every Friday, Price 3d.

Technical Editor :  
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Scientific Adviser :  
Sir OLIVER LODGE, F.R.S.

## TOPICAL NOTES AND NEWS.

### Aerial Wire.

THE manager of a large wire manufacturing company told me the other day that nearly 14,000 miles of aerial wire has been erected in Great Britain in the last twelve months.

### The King's Speech.

THE King has consented to the broadcasting of his speech at the opening of the British Empire Exhibition at Wembley on April 23rd. The speech will be simultaneously broadcast from all stations, and it is probable that loud speakers will be erected in and about the exhibition so that the large audience at Wembley will be able to hear the King.

### An Australian Find.

AN Australian friend of mine writes that some wireless apparatus was discovered buried in the sands near Sydney. The parts found consist of a rusted dynamo, terminal points on a dry rotted wood base, a resistance coil, and some bulbs filled with crimson-coloured fluid, and a portion of a newspaper dated 1917. It is thought that this apparatus was used, or was intended to be used, by aliens for communication with the enemy.

### Sets on the Hire System.

NOTICE that wireless sets are now obtainable on the hire purchase system. The idea is an excellent one, and is another advance to promote wireless interest. Major Hardinge, the manager of the Marconiphone Company, who was one of the first to start the idea, told me that the B.B.C. cannot have too many listeners, and there is a large section of the public which would like sets but the "family exchequer" did not permit such a luxury. This hire system will undoubtedly assist them.

### Licence Figures to Date.

THE Postmaster-General states that the number of broadcast receiving licences issued between October, 1923, and February, 1924, inclusive, in nine postal districts, was as follows:

London .. 200,000	Aberdeen .. 10,000
Cardiff .. 16,000	Bourne-
Sheffield .. 8,000	mouth .. 9,000
Birmingham 30,000	Newcastle.. 30,000
Manchester . 39,000	Glasgow .. 44,000

Approximately 83,000 broadcast licences were in force in the whole of Scotland on February 29th last.

### A Well-Known Amateur.

IN the amplifying room at 2 L O the other day I met Mr. Partridge, the well-known amateur and wireless detective, employed to fill the black book of the B.B.C.,

which is already nearly full of "spark" and "oscillating" offenders. It will be remembered that Mr. Partridge was the first amateur to communicate to America and receive a reply. The B.B.C. have now engaged him to assist on the engineers' staff. This is the third amateur I know who has joined the staff. The others being 5 H Y and 2 O M. If all the good amateur transmitters join the B.B.C. we shall sometimes miss the best part of an evening performance.

### A Query.

ONE or two of our readers have noticed that in "300 Wireless Questions Answered" slow cooling is advised to anneal brass, whereas they have seen



The aerial at Scotland Yard used for communicating with the travelling wireless car.

the cooling done quickly by immersion in water, etc.

Actually much depends upon quality and temperature, and the safer course was advised. Quicker cooling is often successful, although (to quote the "Encyclopedia Britannica") the cooling must always be gradual.

### The Marconi Strike.

STRIKES seem to be the vogue just now. The Marconi operators at Radio House struck work recently, just at a time when the London closing market prices have the greatest influence on American exchanges. The trouble was the reduction of war bonus, which the operators objected to, on account of the cost of living. Broadcasting companies in America are debating whether to strike or

not, but fortunately "Big Ben" intends to continue to strike in spite of the arrangements made by the B.B.C.

### Effects of "George."

"GEORGE," the well-known dog-artist of 2 L O, was responsible for considerable damage to an amateur's set when he broadcast a "dog solo" recently. The amateur placed a pair of 'phones on his dog's ears, and when he heard the "voice" of one of his own race he rushed to the end of the garden and out into the street with a wireless set dragging behind him!

### A Canine Competition.

I MET "Uncle Leslie" (L. G. M., of the "Daily Mail") the other day, who was responsible for the introduction of "George" and the "dog concert." He told me that he received 300 letters from listeners, from John o' Groat's to Land's End, all expressing their appreciation for that excellent soloist, George. One listener said that his bulldog went to sleep when it heard George's effort. Uncle Leslie told me that he may start a dog competition, because so many listeners claim that their particular dog sung the chorus the loudest, and he thinks that if he invited the dogs to 2 L O and appointed George the umpire, some really good talent would be found. I advise competitors to see that they have a dog's licence with them, as the licence authorities may be one of the uninvited guests, especially if a large number of dogs attend.

### A Person of Means.

TALKING of licences, I read in the paper the other day of a police-court summons. The counsel for the defence asked an elderly lady if she thought defendant had "means."

"I am sure of it, sir. Why, he's got a wireless licence and a dog's licence!" was her reply.

It is evident that if you possess these two licences you have means. I hate ostentation!

### The President's Cat.

"TIGE," the favourite cat of the American President, escaped from White House recently. A detailed description of "Tige" was broadcast, and the finder was asked to "return same" to White House. Next morning several hundred cats were brought to the President. Among them was "Tige," whom one of the guards found in a munition building near by. It is not known what "Tige" intended to do in the munition building, but I am told that early in the

(Continued on page 194.)



NOTES AND NEWS.

(Continued from page 193.)

day he had a row with the President, and in his temper "Tige" went away, and he didn't say where, and he didn't say why, and he didn't say how, nor did he kiss the President good-bye. . . . Still, radio has its uses.

A Radio Row.

THE three-cornered radio controversy between China, Japan, and the United States was enlivened the other day by the announcement that the Japanese Mitsui Company's station fifteen miles from Peking is finally perfected, and will shortly operate between Peking and London, New York, Berlin, and Copenhagen, and other world capitals, with a faster and cheaper service than that of the cables. This announcement has surprised the governments of China and America. Some American representatives are hurrying to Peking to take up the entire situation with the Chinese Government, as the contract has also been given to America.

A Correction.

RECENTLY I mentioned that a fire broke out on the top of Northolt wireless mast, and the Uxbridge Fire Brigade extinguished the flames. This week I received a letter from one of the firemen, who says that several fire brigades were called out, but the Uxbridge Fire Brigade was the only one to tackle the job. Three men climbed the 450 foot mast and hacked away the burning wood.

The Television Prize.

THE Editor asks me to say that it has not been possible to include in this issue the particulars of Dr. Fournier D'Albe's wireless television system, for which he was recently awarded £150 by this journal. The Editor tells me that details will appear in next week's issue, and that an article by Dr. Fournier D'Albe himself will shortly be published in POPULAR WIRELESS.

Canadian Wireless.

A CANADIAN reader writes that wireless is playing an important part in the colonisation of Canada. Since the beginning of this year eleven licences have been granted for broadcasting stations, making a total in Canada of forty-five. The number of listeners is small considering the population of this great colony. The number is approximately 29,000.

A Jubilee Banquet.

SOME interesting speeches were made at the Jubilee banquet of the London Physical Society the other day. Among the guests I noticed Professor Fleming, Sir Oliver Lodge, Professor Rankine, Sir J. J. Thomson, Sir Ernest Rutherford, and many other distinguished physicists. The Duke of York, the Prime Minister, Lord Haldane, and others were guests. In the

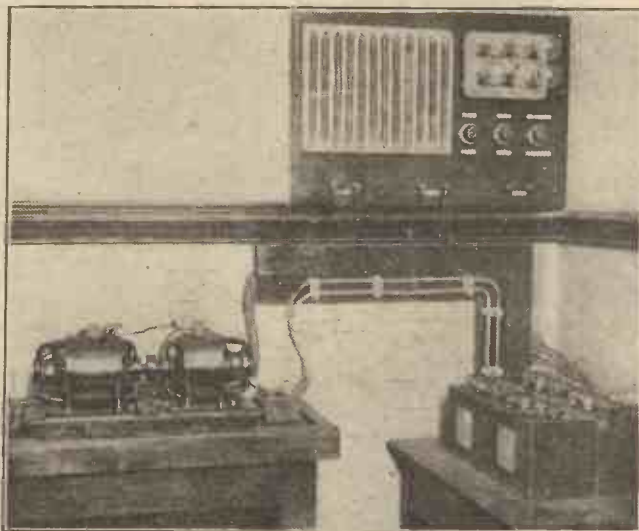
course of his speech Lord Haldane referred to Sir Oliver Lodge as "the champion of the ether theory."

A Bournemouth Ban.

THE Bournemouth Corporation is considering whether they will allow innumerable aerials to be erected on the beach, having anticipated that summer visitors will want to install receiving sets in the beach bungalows and tents. They have already decided not to allow loud speakers to disturb the tranquillity of the beach.

A Good Idea.

THE manager of the Marble Arch Pavilion tells me that he intends to install loud speakers in this theatre to enable the audience to hear the King's speech, which is to be broadcast on the opening day of the British Empire Exhibition.



The motor generator and control gear at Scotland Yard, which is used in connection with the travelling wireless car.

Early Days.

THE manager of the Pavilion is a well-known amateur, and often transmits excellent items from his station, 2 BZ. Many early wireless experimenters may remember this station in the days before the B.B.C. existed. 2 BZ once booked a film by wireless whilst travelling in an aeroplane to Paris.

Cinema Relay.

I AM also told that arrangements have been made with 2 L O and the Pavilion at Shepherd's Bush to relay special music items from that theatre. It is stated that the organ of this picture theatre, which is under the stage, is situated very well for broadcasting purposes. It is hoped that the first item will be broadcast at the end of this month.

Gilbert and Sullivan

MR. D'OILY CARTE and Mr. Herbert Sullivan have given permission to the B.B.C. to broadcast all the overtures from Gilbert and Sullivan's operas as originally composed by Sir Arthur Sullivan.

The overtures will be played from parts supplied by Mr. D'Oily Carte by an orchestra in the studio of 2 L O, and will be broadcast simultaneously throughout the country. The first performance will be in a few weeks' time.

Sir Oliver Lodge to Broadcast.

SIR OLIVER LODGE, our Scientific Adviser, tells me he will be broadcasting from 2 L O on May 7th, at 9.15 p.m. His subject will probably deal with astronomy. His lecture will be given on behalf of the British Science Guild, whose monthly science talks are such an excellent feature of 2 L O's programmes.

Sermons from Sheffield.

COMMENCING on Sunday, April 6th, sermons will be broadcast from the studio of the Sheffield Relay Station by local clergymen, instead of "talks" from the Birmingham station. It has been arranged that in the course of five weeks, two Church of England clergymen, two Free Church ministers, and one Roman Catholic priest will give addresses on Sunday nights.

Experimental Licences.

IN the course of a lecture delivered by Mr. Philip Coursey, he commented on the attempt that is being made to pass a Bill in Parliament which would not make things any easier for the experimenter. There have been attempts to withdraw the right to issue experimental licences, and certainly in future it is likely to be a very difficult matter to gain such licences. I am told, however, that the Radio Society of Great Britain is preparing a campaign to counteract the attempts referred to.

5 W A's Director.

MAJOR SMITH has received a promotion in the company, and will be attached to the programme staff in the London office. He was the first to produce an opera in a B.B.C. studio, and the first B.B.C. official to compose an opera. Major Smith has wide experience in the entertaining world, and has made a success of one of the most difficult stations of the B.B.C.

A New Trouble Maker.

IN America, where they go "all out," or not at all, the wireless craze has come to the breaking-up of happy homes. I have heard that several divorce cases are in the courts through husbands becoming wireless enthusiasts. One wife has gone so far as to sue for a divorce, citing the family wireless set as having alienated her husband's affections! I can quite imagine wives objecting to living in the same house with a husband who is always "in the air."

In the Police Court.

JUDGE (to prisoner): "I seem to remember seeing you before."  
Prisoner: "Yes, sir; I taught your son how to make a wireless set."  
Judge: "Twenty years."

ARIEL.



# WIRELESS IN AUSTRALIA.

From A CORRESPONDENT.

Some interesting details of the growth of wireless telephony overseas, and the methods by which broadcasting is carried out and received "down under."

ON May 24th, 1923, a conference of all interested in broadcasting was held in Melbourne at the invitation of the Postmaster-General. A committee was selected to draw up draft regulations which, with some modifications, were adopted by the Commonwealth Government. Under these regulations competitive broadcasting was provided for.

Any firm may now establish a broadcasting station by obtaining a licence from the Commonwealth Government, which binds them to continue a reliable service for five years, and lodging £1,000 with the Government as a guarantee.

## Fixed Tuning.

The power used by broadcasters must be between 500 and 5,000 watts, while wave-lengths are allotted between 250 and 3,500 metres, by the Commonwealth authorities in consultation with the broadcasting firm. The broadcasters may make a charge for their services. We may thus have several broadcasting stations in one city on different wave-lengths and making different charges for their services.

In order to insure that only the service paid for is received by the broadcast listener, the sets sold to broadcast listeners are designed to receive only on the wave-length of the broadcasting station to which they subscribe; with a maximum of ten per cent "tolerance," so that they may tune in the station accurately should its wave-length vary slightly, and are sealed with a Government stamp, so that only by intentional tampering can other wave-lengths be received.

The regulations provide for two types of amateur receiving licences—broadcast and experimental—and also for experimental transmitting licences.

## Private Broadcasting Stations.

The procedure of a person desirous of listening to broadcasting is as follows:

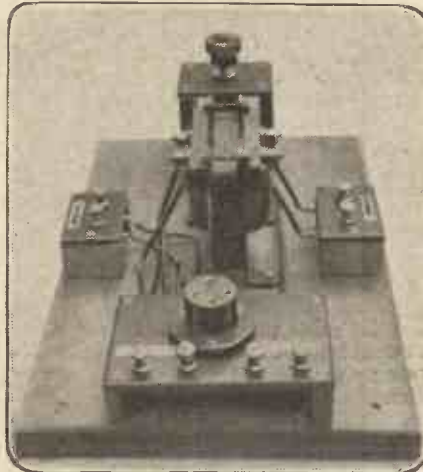
First he selects which station he desires to listen to. Then he purchases a set (which may vary from a crystal set to a multi-valve set) sealed to that station's wave-length. On purchasing the set from the broadcasting firm's agent, he must also pay the subscription (if any) for one year to that company, and 10s. licence fee to the Commonwealth Government. He is then at liberty to install his set and do his worst. Since aerial reaction is forbidden in broadcast sets he can only sin against himself. Since the gazettement of the regulations six broadcasting licences have been granted in Australia. Two stations are now in operation in Sydney.

Farmer and Company, Ltd., have installed a high-powered station at Northbridge, a few miles from Sydney, using a wave-length of 1,100 metres. The aerial is of the cage type, supported on two steel-lattice masts, each 200 feet high, and 575 feet apart. There is no direct earth, but instead, an earth screen 15 feet above the ground is

used. The maximum allowable power is to be used, namely 5 kilowatts, but pending the completion of this set, a 500-watt set is being used, and the volume and quality of the station leaves nothing to be desired.

The broadcasting studio is not situated at the station at Northbridge, but on the roof-garden of the company's premises in the heart of Sydney, where there are two sound-proof rooms to be used alternately to prevent delay between items. The studio is connected by land-line to the station. Connections are also made to leading theatres, etc. The annual subscription to this station is three guineas.

The other Sydney station is Broadcasters (Sydney), Ltd., on 350 metres. The company really consists of firms interested



An experimental L.F. amplifier, constructed by Mr. R. S. Sharvell, of 81, Rectory Grove, S.W. 4. This photo shows how conveniently the components have been arranged to facilitate experiments.

in the sale of wireless gear, and they provide a free service.

A broadcast listener may buy a set which will respond to any number of broadcasting stations provided that he pays the fees of the companies to which he listens, or he may have his set altered to respond to any other station by paying the fee to that station.

## Amateur Transmissions.

Provision is also made for those who wish to construct their own broadcast receivers, provided that they comply with the conditions with regard to wave-length, and make their sets so that they can be sealed by Commonwealth authorities. A small charge is made for sealing. In conclusion, there can be no doubt of the success of broadcasting here. It will be a great boon, especially to isolated districts where city amusements are otherwise unprocurable.

Soon after the end of the war, amateurs began to take out wireless licences—they cost £2 in those days. There was no broadcasting then, but an amateur of Strathfield, near Sydney, Mr. Charles Maclurcan, who is generally recognised as Australia's leading

amateur, transmitted concerts weekly on 1,400 metres. After a week of Morse one looked forward to these concerts, and the speech and music was of wonderful quality.

## Surprising Results.

Conducting tests with an operator on a ship proceeding to New Zealand, Mr. Maclurcan was heard as the ship lay at the wharf in Auckland (1,400 miles), transmitting on nine watts. Mr. Maclurcan was also heard on C.W. by a ship at Darwin, using a single valve for reception, a distance of 2,100 miles overland. The transmitting power (in the anode circuit) was 8.75 watts. Mr. Maclurcan has since reduced his wave-length on two occasions, and now, in accordance with the regulations, he transmits on 240 metres, but has maintained a regular weekly programme for a couple of years or so until recently when he closed down for a special test.

On 240 metres he established two-way communication with an amateur in New Zealand in September last, and reduced his power in steps down to 0.0037 watts (plate voltage 15, milliamps 0.25), when his signals were still plainly heard.

The readings of the instruments were checked by disinterested observers, and the instruments themselves checked and certified correct to 1% by an expert. He also succeeded in sending to Melbourne through strong atmospheres on 0.12 watts.

A Melbourne amateur also sent speech and music to New Zealand, using a Marconi R receiving valve for transmission.

## Experimenter's Position.

With regard to the position of the experimenters in Australia, it must be admitted even by ourselves that it is fairly satisfactory. There are no restrictions of aerial size although aerial reaction is forbidden except in very special cases, and then the operator must be able to receive Morse at 12 words per minute. The experimenter has to pay ten shillings per annum to the Commonwealth Government for a licence, but does not have to pay anything to the broadcast companies, on whose services he is supposed not to "poach" unless he pays their subscription.

He can, of course, receive on any wave-length he pleases, and transmit on wave-lengths up to 250 metres. Transmission is allowed at all times, and no interference with broadcasting is noticed.

Spark signalling is discouraged—indeed is never heard—I.C.W., C.W., and telephony being used almost exclusively.

In order to eliminate interference with broadcasting, the powerful Sydney coast station (on 600 metres) has recently changed from spark to the more sharply-tuned I.C.W., so that incidentally interference on amateur wave-lengths except for an occasional ship which may be very broadly tuned, is practically nil. Atmospherics, however, sometimes trouble us in summer and make reception unpleasant.



## POETRY AND BROADCASTING.

By "ARIEL."

In this interesting interview Mr. John Drinkwater, the famous playwright and author, gives his opinions on broadcasting.

IN an interview with Mr. Drinkwater the other evening, I asked him what he thought of broadcasting in relation to poetry. Mr. Drinkwater, it will be remembered, recently read some of his own poems before the microphone at 2 L O. He is, I believe, the first English poet to have done so, and I was interested to know how he liked the experience, and what influence he considered wireless should have on poetry, and on literature generally.

Mr. Drinkwater replied that he thought broadcasting would prove of the greatest value to poetry.

### A Boon to Poets.

"I am only too happy," he said, "to think that science has provided poets with this new medium for self-expression. After all, the earliest poets recited their own works, or traditional ones, to large audiences, just as the news was 'broadcast' to the villagers or townsmen by the town-crier, so literature in those days was spread over countries by word of mouth.

"And now wireless has brought back this old custom, though the audiences are larger than ever. A poet naturally prefers to read his own poems direct to the people for whom they were written, rather than allow others to read them for him, or to be content with merely publishing them. For so often the people who might appreciate his work never come across the book."

"What, in your opinion, has been the effect of broadcasting on drama, and on the theatrical profession?" I asked.

"Well," he replied, "it is difficult to say yet how it will affect the drama, but it has undoubtedly opened up a fresh field for actors, and given employment to many who had little or no chance on the legitimate stage. The theatrical profession is, of course, very overcrowded, and the British Broadcasting Company has discovered much talent which had inevitably been lost sight of in the theatres. It should also be possible by this new medium to put before the public a more varied dramatic programme. The cinema has already discovered the type of drama which is most suited to its methods. Perhaps we shall soon listen-in to plays which, produced by any other means, would have been less effective."

"Then you think that really good plays could be written specially for broadcasting?" I suggested.

### Broadcast Plays.

"I should prefer to have read one that had been so written before expressing an opinion. It should be possible to write plays that would broadcast successfully, but a good play is another matter. I, for my part, believe that having nothing to look at must prove a serious drawback."

"How far do you think that the plays recently broadcast were satisfactory?" I then asked.

"I think," answered Mr. Drinkwater thoughtfully, "that there would be room

for improvement in the matter of production. In wireless drama, it seems to me, the whole effect will depend upon vivid dialogue. The voices of the actors will be of supreme importance, and I think the cast should have been chosen with this in view.

"For instance, in the 'Trial by Jury,' recently broadcast, it would have been easier to follow if the Judge had had a low voice, and if that of the Counsel for the Plaintiff had been pitched on a comparatively high key. Hitherto, I have always found it very difficult to distinguish between the voices of the various characters in broadcast plays."

### Poetic Drama.

"Then you have no criticism to make of the type of play chosen by the British Broadcasting Company?" I inquired.

"No, I consider that the choice of Grand Guignol plays, as far as it went, was well-advised. A plot that is both compact and arresting will hold the imagination by whatever medium it is presented. Grand Guignol plays, too, depend less than most on their setting. But I, as a poet, cannot but feel that broadcasting is particularly adapted to the production of poetic drama.

"Shakespeare, for instance, needs nothing beyond the beauty of his language. One can get as much enjoyment by reading him as by seeing his plays on the stage. At the most, he gains something from the voice and delivery of the actors, and this broadcasting gives. And this is another service which wireless may render to poets—it may give them an incentive that the legitimate stage has been slow to offer. They will also feel that they are being heard and appreciated by a wider audience than ever before."

## AN INTERESTING B.B.C. EXPERIMENT.

WITH its massive and scientifically constructed steel masts, raising their stately heads 480 ft. above terra firma, M Z X, the Chelmsford station of the Marconi Wireless Telegraph Co., Ltd., is once more to play an important part in the progress of radio-telephony; it is the site chosen by the B.B.C. for the erection of their 25 kilowatt experimental broadcasting station. It will be the most powerful station of its kind in the world, and will work on a wave-length of 1,600 metres. The licence will be granted for experimental purposes only, until the Government is satisfied that it will not interfere with the State services.

### Early Experiments.

It is interesting to recall some of the pioneer experiments of M Z X, which,

apart from a few low-powered amateurs, was the first station to broadcast radio-telephony.

As early as May 27th, 1919, experimental transmission was undergoing extensive tests; on this occasion, two omnibuses, both elaborately fitted with receiving apparatus, were sent in different directions from Chelmsford—one to a spot near Maldon, a distance of 9½ miles, and the other to a spot near Braintree, a distance of 11 miles; to receive and report on the reception of radio-telephony transmitted from M Z X, on a wave-length of 850 metres, with a power of ½ kilowatt. The reception was reported excellent.

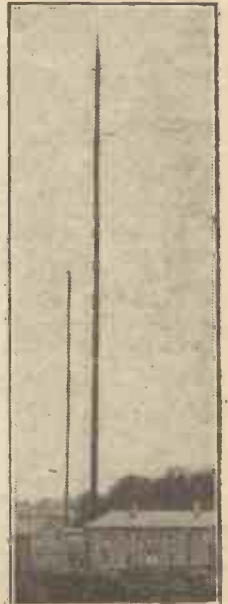
However, it was not until February 23rd, 1920, that the first concerts were broadcast from M Z X, these being continued until March 6th, 1920, on a wave-length of 2,800 metres, and a power of 15 kilowatts; there was then a break for further experimental work.

On June 15th, 1920, a first-class concert was transmitted on a high-power, in order to obtain reports of long distance reception, these being received from Rome, Scandinavia, and even more distant places. It was on this occasion that Dame Nellie Melba's voice was broadcast for the first time.

### Writtle's Famous Station.

Having now reached such an advanced stage, it became necessary to erect a station from which concerts could be regularly broadcast for the benefit of the already growing army of amateur enthusiasts who had now become interested in this advance of modern science. So a temporary station was erected at Writtle, 2 M T (2 B O Private), a village about two miles west of M Z X. This station commenced transmitting on February 14th, 1922, on 700 metres, until May 29th, 1922, when the wave-length was subsequently altered to 400 metres, with a power of ¼ kilowatt. It was to this station that enthusiasts looked forward to the weekly half hour's concert, which emitted from the little "studio" contained within the four walls of an ex-Army hut. But 2 M T's life as a concert transmitter was very short, for it ceased immediately 2 L O was opened. 2 M T's masts still raise their heads above the little "studio" which is now taking a prominent part in experimental work.

If the experiments shortly to be commenced at M Z X prove a success and full permission for the erection of a permanent 25 kw. broadcasting station is obtained, wireless telephony will have made yet another great step forward, and with such large power stations in various countries telephonic inter-communication and broadcasting should be an easy matter.



M Z X, the Chelmsford station of the Marconi Company.



# B.T.H. RADIO VALVES

## IMPORTANT NOTICE

regarding

## Radio Valve Patents

### An Injunction with Costs & Damages

ON the 14th. March, 1924, in the High Court of Justice, Chancery Division, Mr. Justice Russell, in the action of THE BRITISH THOMSON-HOUSTON Co. Ltd. (Plaintiffs) v L. E. FALCY (Defendant), made an order restraining the said L. E. FALCY from making, selling, or otherwise dealing in Wireless Valves in any way infringing THE BRITISH THOMSON-HOUSTON Co's Patents Nos. 23,499/1909, 23,775/1912, and 148,132 of 1922, together with damages and costs.

On the same day, in a further action in the same Court, the said Mr. Justice Russell granted an injunction against the said L. E. FALCY restraining him from infringing THE BRITISH THOMSON-HOUSTON Co's registered Trade Mark "MAZDA," and from passing off goods not of THE BRITISH THOMSON-HOUSTON Co.'s manufacture as or for the goods of THE BRITISH THOMSON-HOUSTON Co. Ltd., and also providing for payment of costs and damages.

*Legal proceedings will be brought against Infringers, whether importers, sellers, or users of infringing valves, to restrain them from infringing the above-mentioned Letters Patent, and also against any person or company unlawfully using the said Trade Mark "MAZDA."*

All Valves manufactured by THE BRITISH THOMSON-HOUSTON Co. bear the stamp of the British Broadcasting Co. Ltd. and also the Trade Mark  of THE BRITISH THOMSON-HOUSTON Co. Ltd

*Issued by the British Thomson-Houston Co. Ltd., Crown House, Aldwych, London, W.C.2.*



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Maximum Inductance. Minimum Self-Capacity.  
Increased Signal Strength. Maximum Air-Spacing.

Coil No.	Minimum.	Wavelengths in Metres when shunted by Condensers as under:			Price. s. d.	Coil No.	Minimum.	Wavelengths in Metres when shunted by Condensers as under:			Price. s. d.
		'0003 mfd		'001 mfd				'0003 mfd		'001 mfd	
		Max.	Max.	Max.				Max.	Max.	Max.	
25	57	230	300	375	5 0	250	500	2000	2900	4150	9 0
35	83	300	380	515	5 0	300	680	2500	3400	4940	9 5
40	95	360	470	650	5 2	400	800	3400	4400	6380	10 3
50	124	425	570	780	5 2	500	1020	4250	6000	8900	10 6
65	140	475	680	1000	5 6	600	1200	4750	7000	12100	11 0
75	170	620	800	1120	5 6	750	1500	6000	8000	15000	11 10
100	230	850	980	1520	7 0	1000	2000	8100	9300	20000	12 8
150	340	1000	1520	2300	7 10	1250	2200	9750	15000	22000	14 0
200	420	1400	2300	3100	8 8	1500	2900	12500	18000	26000	15 0

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WIRELESS ACCESSORIES

NEW EBONITE LOUD SPEAKER TRUMPETS.

Small Stem 3", 14" high, 5 1/2" across Bell 9/- each.  
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VARIABLE CONDENSERS. THE BEST YET. BOTH SETS OF VANES ADJUSTABLE.

'001 8/6 ea. '0005 7/- ea. '0003 5/9 ea. '0002 5/- ea.  
Vernier 4/- ea. All true to capacity and include knob and dial.

THE MICROSTAT. For governing every type of Valve, including Dull Emitters

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VALVE WINDOWS. Dust proof, either in Nickel-plated or Brass Finish with all Nuts and Bolts

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BLACK FIBRE STRIP. 4 ft. x 1 in.

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BASKET COIL FORMERS. PRESSPAEN

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# A USEFUL FOUR-VALVE SET.

By "RADIOGRAPH."

This article gives the details of a very sensitive receiver, capable of a long range of reception, and one that will operate a loud speaker with considerable volume.

IN this instrument the circuit is of a straightforward description, and is designed with the greatest possible degree of simplicity to enable amateurs who have mastered the constructional details given in previous articles to carry out the work without difficulty.

Of the four valves employed in the circuit, the first acts as a high-frequency amplifier, the second as a detector, whilst the third and fourth serve to magnify the signals at audio-frequency, i.e. to increase the volume of the sound.

### The Circuit Employed.

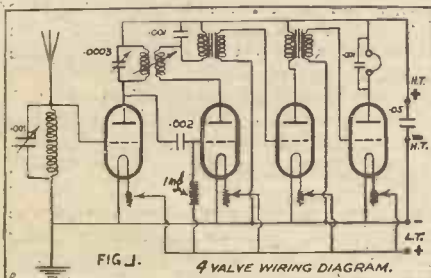
The aerial and anode circuits are tuned by means of plug-in coils, together with variable condensers. For the sake of simplicity, and for use on all wave-lengths, the aerial tuning condenser is wired in parallel with the tuning coil, but, if so desired, the lay-out may be modified to include a series-parallel switch, such as has been frequently mentioned in previous issues.

Reaction is obtained by connecting a coil in circuit with the anode circuit of the detector-valve, which is coupled with the tuned anode of the first or H.F. valve, thus permitting the use of reaction effects without infringing Post Office regulations.

The arrangement of the circuit is clearly shown in the diagram reproduced as Fig. 1, and as in previous sets described in this series, all the components are of standard manufacture, but the design permits of a greater selection than with some of the other sets described. Thus the constructor will be able to use up any components he may possess, or purchase, such as may suit the convenience of his exchequer. Though Igranite sets of tuning coils are specified in the list given below, basket coils, which may be home made, can be used with equal success if so desired.

### Selection of Components.

The following are the components required, together with the present ruling prices:



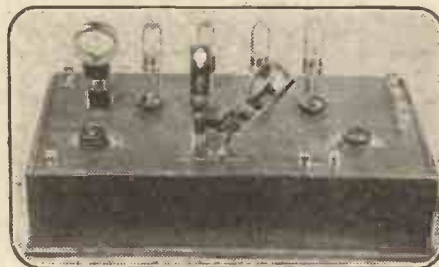
One ebonite panel, 12/6; one variable condenser, .001 mfd. (air dielectric), 10/6; one variable condenser, .0003 mfd. (air dielectric), 5/3; four Fuller rheostats, 10/-; one Dubilier grid condenser, .0002, 2/6; one Dubilier grid leak, 1 megohm, 2/6; two Dubilier fixed condensers, .001,

6/-; one two-way coil holder, 5/6; one single coil holder, 1/-; Igranite coils, Nos. 35, 50, and 75, 16/6; two transformers, 45/-; one .05 mfd. blocking condenser, 2/-; terminals, wire, and screws, 4/-.

### Preparing the Panel.

Fig. 2 gives full dimensions of the panel, and also shows the various positions where the holes have to be drilled for mounting the components, the marking out being performed in the manner described in connection with previous sets.

If one desires to make a really first-class job of the set, the panel should be submitted to an engraver, who will engrave the scales and the necessary lettering for about 5/6, which considerable adds to the value and appearance of the set. As soon as this is done, it is a good plan to apply a simple test to the transformers, which, though generally reliable, may possibly have suffered some damage owing to their delicate construction.



The complete receiver which has a remarkably clear panel.

In order to carry out this test, a small two-volt battery and a pair of 'phones are required, which are connected in series with the primary and secondary circuits of the transformers in turn. On completing each circuit, a click will be heard in the 'phones, and to distinguish between the primary and secondary circuits, the former will be found to give the louder click. Should the 'phones fail to respond, the natural conclusion is that a break exists at some portion of the transformer winding, in which case it is useless to expect any results from the faulty component.

### Mounting the Components.

Readers who have followed the sequence of operations described for the previous sets will have become familiar with the constructional process about to be detailed, but in order to make this article self-contained, we will proceed to give full working particulars. First of all, the sixteen valve sockets are bolted through the panel, and

then the rheostats may be fixed. The latter components need not be of the most expensive type, provided they have a resistance of 7 ohms each, for use with a 6-volt accumulator, and are reasonably smooth in action, otherwise noises will occur in the instrument when regulating the filament current. These rheostats are usually supplied with ebonite or fibre bases, for securing them to the panel by small set screws, also supplied with the rheostats.

### Method of Wiring.

For the sake of general convenience, the reader is recommended to purchase the type of condenser which is fixed by a single lock nut, of which there are several on the market, and these are mounted in the positions indicated in the accompanying photographs. The battery and 'phone terminals are then bolted into place, and when the coil holders are mounted in their respective positions, this part of the work is completed.

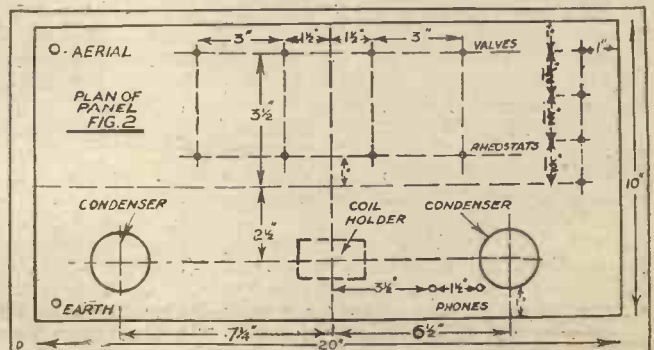
When about to commence the wiring of any set, the operation should first be divided up into sections, as follows: (1) The negative L.T. supply; (2) The positive L.T. supply; (3) The negative H.T. supply; and (4) The positive H.T. supply. It may be added, however, that sections 1 and 3 are combined in a single lead.

The wiring of the negative L.T. leads is commenced by soldering a lead from the negative terminal of the H.T. battery to the negative terminal of the L.T. battery, from whence the same wire is soldered to one filament socket of each valve holder. From the filament socket of the last connection to be soldered, the wire is continued to the O.S. of each transformer, and from thence to the earth terminal. The latter is connected to the fixed plate stud of the aerial tuning condenser, the lead thus used being finally joined to one side of the aerial tuning coil holder.

### The L.T. Circuit.

The positive L.T. supply commences with the terminal of the L.T. battery supply, to which a wire is soldered, and lead to one terminal of each rheostat. From the last

(Continued on page 200.)





# WIRELESS ON TRAINS.

By "ARIEL."

Recent tests carried out on various main-line expresses have proved fairly conclusively that it is quite possible to obtain comfortable and reliable reception from broadcast stations, even while travelling at a high speed.

"SAY, what's this?" asked the American of the Pullman train attendant. "Broadcasting has now started, sir. Will you take this 'phone, or do you prefer headbands?" answered the attendant.

"Well, say, I'll tell the world! You sure don't mean to say that you Britishers have wireless on trains?" asked the American in amused surprise.

"Yes, sir, and we make no extra charge; you can listen in to 2 L O, or, would you prefer the Cardiff station? Here's the menu—I mean the programme."

## The Talkative Passenger.

"2 L O will suit me, but, say, you sure it's not a phonograph machine?"

"No, sir, it's wireless," answered the now somewhat irritated attendant, who passed on to the next table, distributing 'phones to the passengers.

This was part of a conversation I recently overheard in a Pullman car on the London-Dover express. I was asked to meet the chairman of the Pullman Car Company, Sir Davison Dalziel, Bart.; on his return from France, in order that he might show me the Marconiphone installation in the "Orpheus" Pullman saloon. The other passengers were not aware that it was a "wireless train" until we left the station, at 5.30 p.m., and the Pullman attendant began to hand out 'phones. It was very amusing to note the surprise this proceeding caused. One voluble old lady exclaimed: "Oh! how wonderful! Would you believe it was possible! I wish dear Bertie was here. He knows quite a lot about wireless; he's got a very fine crystal set, and is able to add crystals whenever he wants to."

The old lady rambled on, much to the annoyance of the passengers.

"Do you know, he received America on it, and—"

"Silence, please," came the loud voice of the attendant, who had received several complaints from passengers who wanted to listen.

## Special Type of Aerial.

Sir Davison Dalziel and Major Hardinge, the manager of the Marconiphone Company, showed me the installation.

The aerial was fitted above the Pullman car, and was about 45 ft. in length, and about 1 ft. from the roof. The insulators were fixed in such a way that if any part of the aerial was to break no piece would be left dangling, and so cause damage.

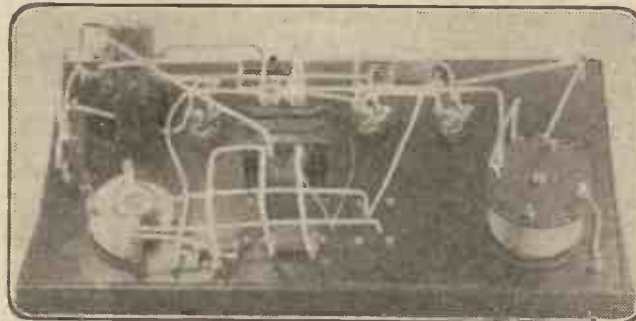
The earth connection was made to the iron work of the train. The most interesting part of the whole demonstration was the fact that no electrical interference was experienced. This was due to a special arrangement of condensers which were con-

nected across the lighting dynamos, cutting out interference.

## Six-Valve Set Used.

The electric fans were treated in a similar manner. The set was a six-valve three-tuning circuit, using four H.F.s, one detector, and one L.F. note magnifier. This was suspended from a cupboard in the car on a mass of sponge rubber. The reproduction was very loud; in fact, at times too loud. "Big Ben" was heard with the 'phones on the table, much to the delight of the passengers.

The whole apparatus was a credit to the chief engineer of the Marconiphone Company, Mr. A. S. Agate. Sir Davison Dalziel told me that as soon as the chief engineer gives the word that wireless is a practical



The simple lay-out and wiring of the four-valve set can be seen from this photograph.

## A USEFUL FOUR-VALVE SET.

(Continued from page 199.)

rheostat terminal, the wire goes to one side of the grid leak, the other side being fastened to the clip of the grid condenser, which is connected to the grid socket of the second valve. The opposite terminal of each rheostat is connected with the remaining filament socket of each valve holder.

A wire is taken from the positive H.T. supply to one telephone terminal, and from thence the same wire is led to the I.P. of each transformer, then being connected to one fixed vane stud of the '0003 variable condenser.

## Completing the Wiring.

From the latter point a wire is taken to the tuned anode coil; and from the opposite side of the same coil, which is the fixed member of the two-coil holder, a wire is taken to the moving vane contact of the same variable condenser, and then goes to the other side of the same coil holder. The latter connection is joined

possibility in Pullman cars, all the Pullmans in the country and all the sleeping cars in France will be fitted with sets.

"The idea," he said, "would be quite good, and would add to the comfort of the passengers and make the journey more pleasant. I may arrange that each receiver will be done up in sterilised paper bags, so that when a passenger wants to listen-in, he can call the attendant and obtain one. The idea would, I think, meet with general approval, and also the public would be satisfied that the receivers were clean. I shall have plugs arranged along the side of the car, so that they are easily accessible."

The Marconiphone engineers are arranging a set which would not necessitate continual tuning; all the attendant would have to do is switch on.

It is interesting to note that from Dover to Victoria the tuning controls were not touched once, and the volume of sound remained approximately the same.

## Effect of Tunnels.

Tunnels made a little difference to reception, and it is thought that the very little interference which was experienced when passing through them would shortly be overcome. It will, of course, be some time before any apparatus could be made to eliminate the fading which is experienced in tunnels and cuttings of any size; the average tunnel on the railways is not usually long enough to cause anyone to lose his temper when trying to listen to the latest news bulletin.

I am assured that within a few months—perhaps weeks—most of the main-line trains in the United Kingdom will have wireless receiving apparatus installed, and in this event much credit will be due to the foresight and enterprise of one who is ever seeking some comfort for his passengers—Sir Davison Dalziel.

with the plate or anode socket for the first valve, and terminates at the anode side of the grid condenser.

From the O.P. of the first transformer a flexible lead is joined to the moving member of the two-coil holder, which carries the reaction coil, and from the opposite side of the same coil holder, a lead goes to the plate socket of the second valve.

The O.P. of the second transformer is connected to the plate socket for the third valve, and from the remaining telephone terminal, which as yet has not been connected, a lead is soldered to the plate socket of the fourth valve.

Across the telephone terminals a '001 condenser is shunted, another being shunted across the primary circuit of No. 1 transformer. A condenser of from '05 to 1.0 mfd. capacity is shunted across the H.T. battery terminals, which completes the whole of the wiring, and the set is then ready for use.

Before testing the set, try out the H.T. circuit by connecting up everything except the L.T. battery, and switching on the valves, using only 3 or 6 volts H.T. instead of the usual amount. If the valves light up, switch off quickly and trace out the wiring, as the H.T. circuit is faulty and if left will blow the valves.





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## LOUD SPEAKER

**£5.5.0**

Resistance  
2,000 ohms.

### “The Televox”

The name Ediswan has always been associated with all that is best in Wireless Products. This Loud Speaker, incorporating several new features, still further enhances the Ediswan reputation.

Most noteworthy among its many claims to distinction is the divided base, the upper half carries the diaphragm, the lower half the magnets. By screwing one into the other the minute degree of adjustment, essential to perfect reproduction, can be obtained. The shape of the horn and the firm assembly of the components completely eliminates resonance. Write to-day for further details.

*Ask for leaflets fully describing our range of Sets and Parts. If your Dealer does not stock, send us his name and address. Free on request. Send a postcard to-day for our Illustrated Booklet, “The Thermionic Valve.”*



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Crystal Detectors, Glass Enclosed.....	1/6 to	2/9
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Cat's Whiskers, Silver, each, 1d.; doz.....		9d.
Packets Mixed Whiskers.....	each	3d.
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Condenser Scales, 0180.....	each	2d.
Aerial, Bath & Phone Name Tabs, ea.		2d.
2 B.A. and 4 B.A. Nuts.....	doz.	2 1/2d.
W.O. Terminals, with Nut and Washer, ea.		1 1/2d.
Telephone Terminals, with Nut & Washer, each.....		1 1/2d.
2 B.A. Knobs.....	each	1 1/2d. and 2d.
Fixed Condensers, .001 to .005, .0001 to .0005.....	each	8d.
Filament Resistances, 1/6, 2/-, 2/6, 4/6, 5/-, With Vernier.....		7/-
The New Microstat Fil. Resistance.....		2/9
Filament Resistance Dials.....		6d.
Ditto, in Ivorine, complete circle, white or black.....		6d.
Pin Terminals, Screw Pattern.....	each	1 1/2d.
Spade Terminals, Screw Pattern.....	each	1 1/2d.
Magnetic Amalg Crystal Fixer.....	each	4d.
18 Gauge Tinned Copper Wire, for connecting up, 3 yds., 2d.; 100 ft.....		1/8
Insulators, Large Reel.....	each	1d.
Insulators, Small Reel.....	2 for	1 1/2d.
Insulators, Egg and Shell.....	each	1d.
Ebonite cut any size while you wait.....	lb.	3/8

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Our price to clear.....16/6.

**ONE-VALVE AMPLIFIERS.**  
In boxes, handsome finish, each bearing a Guarantee and stamped B.B.C.....39/-.

**L.F. Transformers, British made and Guaranteed,**  
11/- each.

**Complete Sets of Parts, to make One-Valve Amplifier, with handsome Ebonite Panel, Ebonite Terminals, Wires and Diagram. A child can construct, 25/-.**  
Ditto, Two Valves, £2-10-0.

**TO CLEAR.** Large stock fine quality Switch Arms, 7d. each.

**New Penton Valve.....10/-**  
**Penton Dull Emitter Valve.....15/-**  
**Ericsson E. V. Type Headphone, known throughout the North as "Uncle Tom's" Marconi-Ericsson's.....12/- pair.**

**Hellesen's Dry Batteries, "Tiger" Brand. For Dull Emitter Valves, 1.5 Volts.....2/8.**

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Plugs and Jacks.....	3/6
Ditto, Superior make.....	5/6
Switches on Ebonite, S.P.D.T.....	1/4 and 1/6
Switches on Ebonite, D.P.D.T.....	3/- and 3/3
2 B.A. Screwed Rod.....	foot lengths 2 1/2d.
H.T. Batteries with Plugs, 30 volts, 4/6; 36 volts, 5/6; 60 volts, 8/6; 90 volts.....	12/6
Tapped Inductance Coil, 20 Tappings.....	2/3 and 2/6
Variometers.....	2/- to 2/6
Single Basket Coil Holders.....	1/3
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'Phone Cords.....	pair 1/-
Coil Plugs, Flat Type.....	9d.
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Ebonite Condenser Knob and Dial.....	1/4
Variable Condensers, complete with Knob and Dial. Finest workmanship. .001, 8/-; .00075, 7/-; .0005, 6/-; .0003, 5/6; .0002, 5/-; .0001, 4/6; Vernier.....	4/-
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Valve Holders with Nuts.....	2d.
Hertzite, Midite, Geosite, Atomite, Concrite Crystals in Stock.....	
Potentiometers.....	7/-
Earth Clips.....	5d. and 6d.

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2-volt 40	-	9/6
2-volt 60	-	12/-
2-volt 100	-	16/6
4-volt 40	-	16/6
4-volt 60	-	22/0
6-volt 40	-	24/0
6-volt 60	-	26/6
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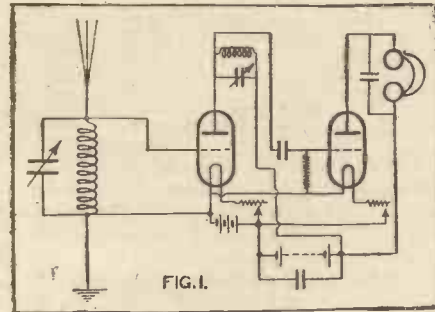
# THE CONTROL OF GRID POTENTIAL.

BY "VARIOTRON."

It is not often that amateurs make use of their valves to the fullest extent, owing to the fact that a great many are unaware that various valves require different working conditions if they are to operate efficiently.

**T**HE experienced amateur realises the necessity of controlling the positive or negative potentials on the grids of his valves (depending on their functions), and it is proposed to discuss here the various methods and reasons for doing this.

Fig. 1 shows a two-valve circuit, the first valve being a radio-frequency amplifier, and coupled by means of the well-known



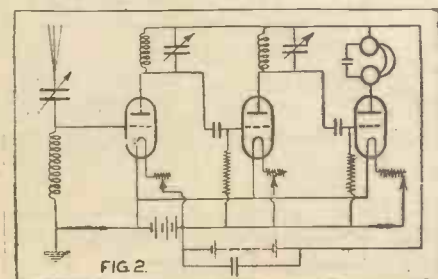
"tuned-anode" or "reactance capacity" method, to the second valve, which is the rectifier.

Such a circuit is very liable to oscillate, and in order to counteract this tendency to oscillate, a positive potential is generally placed on the grid of the first valve. If there is more than one radio-frequency valve, the grid leaks may be connected to the positive of the low-tension battery as in Fig. 2. The grid of the first valve in Fig. 1 may be made positive by using a potentiometer connected up as in Fig. 3.

### The Neurodyne Receiver.

When the slider is to the extreme left, the grid will be at zero potential or slightly positive, and when the slider is at the extreme right, the grid will have a positive potential equal to the E.M.F. of the L.T. battery. (This is assuming that the filament rheostat controlling the radio-frequency valve filament is connected in the positive lead of the low-tension battery.)

Fig. 4 shows a circuit employing three stages of radio-frequency amplification, air-core transformers being employed to couple



the valves. In this case the grids of the valves are connected through the transformer secondary windings to the slider of the potentiometer, which is connected

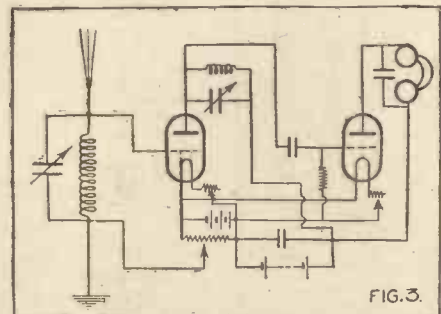
across the low-tension battery leads as shown. The introduction of a positive potential on the grid of a valve causes small grid currents to flow, which introduce damping in the circuit, consequently any tendency to oscillate is suppressed.

The most efficient method of stabilising the radio-frequency valves is by the new Neurodyne method. In this method the grids of the radio-frequency valves are connected together through very small condensers as Fig. 5.

Owing to the proximity of the electrodes of a valve, it possesses a certain capacity, and when the plate and grid circuits are tuned to the same frequency, energy is fed back from the plate circuit to the grid circuit and the valve oscillates.

### Cause of L.F. Distortion.

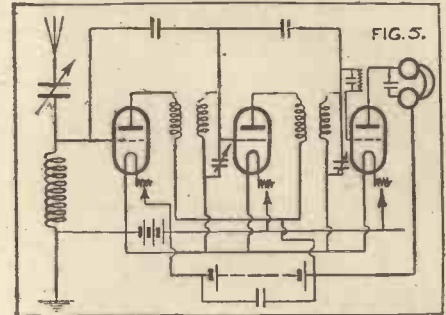
If, however, small condensers having about one-quarter the capacity of the valve are connected between the grids as in Fig. 5, the potentials formed across these condensers will be out of phase with the potentials formed across the condensers due to the inter-electrode capacities, and will thus neutralise them; in other words, these condensers neutralise the inter-electrode capacities of the valves, and thus



prevent the feeding back of energy. This method is the best to use, as there is no distortion or self-oscillation; tuning is much sharper, and higher amplification per valve is obtained than by other methods.

We will now consider the grid potential of valves operating as audio-frequency amplifiers. The grid of an audio-frequency amplifying valve should not be allowed to become positive, otherwise signals will become distorted, owing to the fact that the grid current which flows when the grid is made positive damps the positive half cycles, which are prevented from reaching their proper amplitude. If the grid has

a zero potential normally, the positive half-cycles of current will cause it to be momentarily positive, but the grid current which flows in such case is so small, that there is not much fear of distortion occurring unless



strong signals are being received. If the grid of the valve is made normally negative, there is no fear of distortion occurring due to grid damping.

The grid may be made negative by connecting up the filament rheostat in the negative lead of the low-tension battery, in which case there is a drop of voltage across the filament rheostat, and, assuming the negative end of the filament to be at zero potential, the negative pole of the low-tension battery will have a negative potential depending on the amount of resistance in series with the filament and battery.

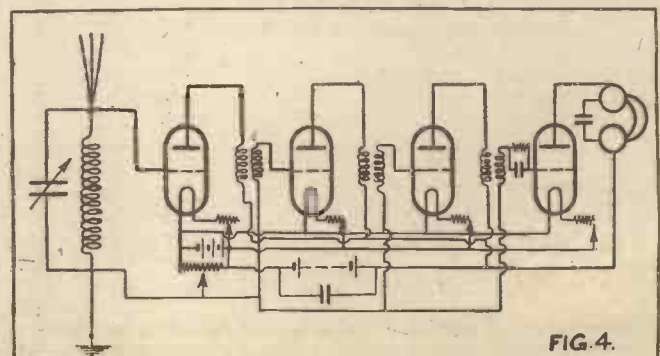
### Power Amplification.

The grid will therefore be at a negative potential, as it is connected through a coil or winding to the negative of the low-tension battery.

When using a valve as a power amplifier with a high potential on the plate, the use of this high plate potential causes the characteristic curve of the valve to move to the left, and distortion may occur if we work on the upper bend of the curve, as one-half cycle of the current causes a bigger change in other current than the other half-cycle; in other words, the valve will function as a rectifier instead of a note-magnifier.

To counteract this, we can make the grid negative, and this causes the characteristic

(Continued on page 204)

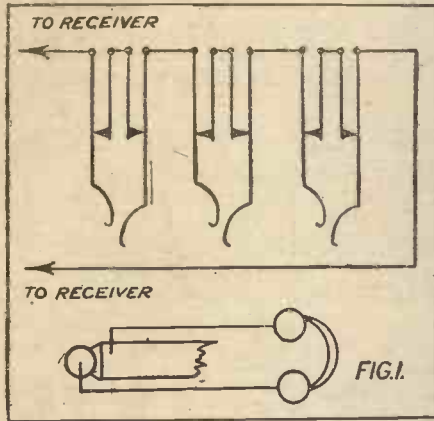




# A 'PHONE JUNCTION BOX.

This little instrument will be found exceedingly useful when two or more pairs of 'phones are to be used.

WHEN it is desired to use several pairs of 'phones at once a junction box becomes a necessity, and although many types of these have been illustrated



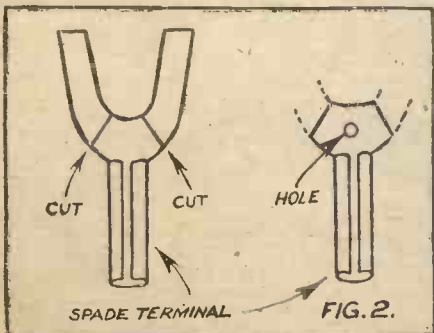
from time to time, most of them suffer from the defect that when another pair of 'phones is pressed into use it is necessary to alter the connections of those already made, with the result that the pleasure of those already listening is interrupted for a short time.

By employing telephone plugs and jacks and constructing a simple junction box, as shown in Fig. 1, all this can be avoided and extra 'phones can be plugged in or a pair withdrawn instantly without a second's interruption or annoyance being caused. A box of this description is easily made, and costs very little.

Jacks and plugs will be required for as many pairs of 'phones as are generally used, and one extra plug and jack for connecting box to panel.

### Screwed Jacks Essential.

The writer finds four pairs a useful number, and accordingly five pairs of jacks and plugs were purchased. These cost 2s. 6d. per pair from a dealer in "W.D." stores, but it is important to note that the jacks are screwed and provided with nuts to facilitate attachment to the panel, as many jacks are on sale



which are not so fitted, and are consequently useless.

The actual box can be of any convenient size; the writer finds 6 in. by 2½ in. ideal for the purpose. The four jacks are fitted to an ebonite panel by means of the nuts provided and are wired as shown in diagram. The box is provided with about 12 feet of flex to which is fitted a plug for attachment to the receiver, and this enables the junction box to be taken well away from the receiver so that it is possible to sit round the fire in comfort and enjoy the evening transmissions.

### Direct Connection Possible.

A jack is, of course, fixed to the receiver in place of the two telephone terminals, and consequently when one pair of 'phones only is required these can be connected direct to the receiver.

The fitting of the telephone plugs to the 'phones may present difficulties to some readers, but the writer finds that the easiest way is to cut and drill two small spade terminals, as shown in diagram 2, and after cutting off the terminal tags, bare the ends of the two wires, dip in molten solder for a



The phones and junction box ready for use.

second, and then clamp on the two tags, which may then be screwed on the plug by the screws provided.

# THE CONTROL OF GRID POTENTIAL.

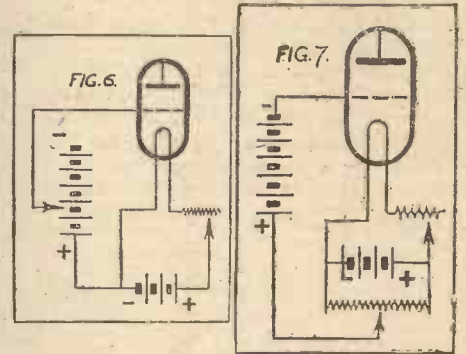
(Continued from page 203.)

curve to be moved to the right, so that we are now working on the slope of the curve again.

As a rule, the greater the potential we employ on the plate, the greater must be the negative potential on the grid. Some valves when operating as power amplifiers with 300 volts on their plates, need a negative potential on the grid of 20-30 volts. For best results, this negative grid potential should be made variable, and one method of doing this is shown in Fig. 6, where the potential may be varied in steps

of 1½ volts by changing the number of dry cells in the grid circuit.

A finer variation of potential may be obtained by using a potentiometer connected up as in Fig. 7. In this case the grid potential will be 9 volts negative when the slider is at the left, but will be only 3 volts negative when the slider is at the right, in which position the grid potential will be the algebraic sum of the negative potential of the grid cells, which is - 9 volts, and the



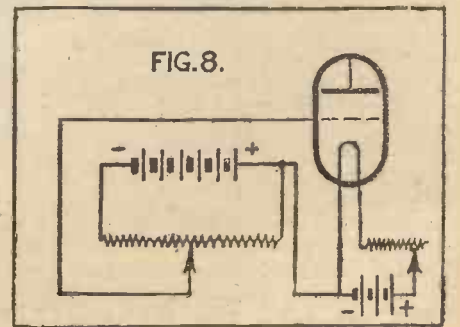
potential of the positive end of the low-tension battery which is + 6 volts—i.e., - 9 + 6 = - 3 volts. The actual negative grid potential will be some 3 volts more than stated above, if the filament resistance is connected in the negative lead of the low-tension battery, owing to the P.D. across the filament rheostat, as mentioned previously.

A further method of varying the negative grid potential is shown in Fig. 8, which also employs a potentiometer. By this method the full potential of the grid battery which is applied to the grid may be varied from zero to maximum.

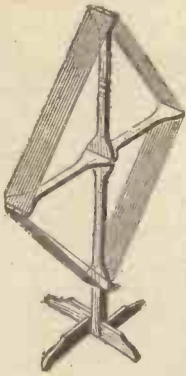
In the case of a resistance-capacity note magnifier, of a choke-coil note magnifier, the grid leaks should be connected to the negative terminal of the low-tension battery, the filament rheostats being connected in the negative L.T. lead.

It is always advisable in practice to connect the filament resistance in the negative lead of the low-tension battery. The filament resistances in the diagrams are placed in the positive leads of the low-tension batteries, so that we could assume that the negative terminals of the L.T. batteries were at zero potential. This was necessary from a theoretical point of view.

It will be seen that the control of grid potential should not be neglected. Experimenters who experience distortion should look to this point.







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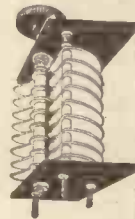
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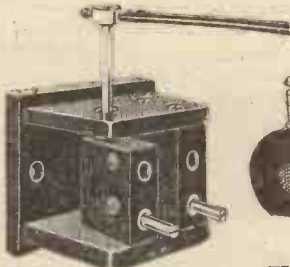
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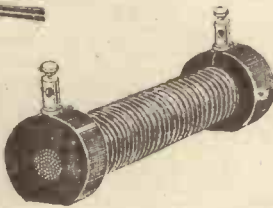
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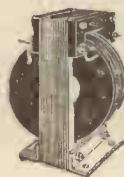


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# THE "P.W." LONG RANGE BROADCAST RECEIVER.

BUILT AND DESCRIBED BY THE TECHNICAL STAFF.

A few weeks ago the description of a coil and condenser-tuned long-range receiver was completed, and, as mentioned in a previous issue, preparations were made for giving the details of construction of a similar set but with variometer control. This article, therefore, describes the variometer-tuned long-range receiver.

IN the variometer tuned set now to be considered a fixed condenser of .0005 mfd. is used as a series condenser, being placed in between the aerial terminal and the variometer, in order to obtain the advantages which accrue from the series condenser.

The diagram of connections is shown in Fig. 1. It will be seen that a .0002 mfd. fixed condenser is connected in parallel with the anode tuning inductance. This is used to obtain good tuning as an ordinary variometer tunes only by virtue of its self-capacity, which is very small and is in consequence liable to cause trouble due to self-oscillation.

### Necessary Components.

The items required are as follows: Fixed condensers, one .0005 mfd.; two .0002 mfd.; two .0003 mfd.; two .001 mfd.; two variometers; two H.T. chokes; one L.F. transformer; one filament rheostat; two valve holders; one grid leak; one grid condenser; sundry terminals.

All the items required have been described in the previous articles, except the variometers and fixed condensers.

Both variometers are constructed in the same manner although they have different windings, and though any type for which the constructor may have a preference may be utilised, the type described below is one which is simple and easy to construct.

### Construction of the Variometers.

It consists in essentials of two basket coils, one fixed and the other pivoted so that it can be rotated to lie either immediately

over the fixed one, or be quite clear of it; by this means the inductance of the variometer is varied, and in consequence the circuit can be tuned to the desired wave-length.

Each basket coil is wound on a former  $4\frac{1}{2}$  inches in diameter with eleven slots, the exact dimensions of each former being shown in Fig. 2.

One coil is fixed to the ebonite panel by a brass screw through its centre. The moving coil is carried on a piece of ebonite of the dimensions shown in Fig. 3, being affixed thereto by a brass nut and screw, the former being clamped by an ebonite washer.

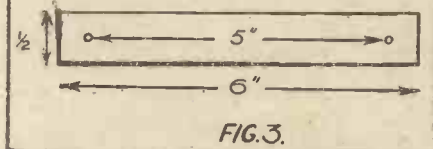
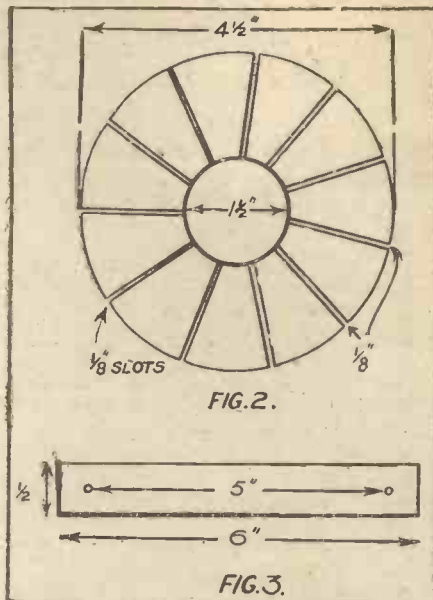
The construction of the spindle carrying this moving former requires considerable care owing to the leverage exerted by the coil, and the arrangement shown in Fig. 4 gives the best results; the dimensions may, however, be altered to suit individual requirements. A brass bush of the dimensions shown is fixed in the panel by drilling a  $\frac{3}{8}$ -inch hole, and covering the bush with seccotine before inserting it in the panel.

### The Moving Arm.

A solid brass bush  $\frac{1}{8}$  inch bare in diameter by  $\frac{1}{8}$  inch bare long is then drilled as shown, with a 4 B.A. clearing drill. Two washers, one  $\frac{3}{8}$  inch in diameter and the other  $\frac{1}{2}$  inch in diameter, are also drilled with the same sized hole. These form the top and bottom bearing plates of the bush.

A piece of 4 B.A. screwed brass rod is then screwed into a standard knob, to which a pointer has been fitted, or into a knob fitted with a scale, whichever it is decided to use. The top washer is placed in position, the solid bush put on the screw next, then the solid bush is inserted into the bush fixed in the panel and the bottom washer placed in position. A thackery or spring washer is next threaded on, and its tension adjusted by means of a nut.

The ebonite strip carrying the moving basket coil is next fitted, and if it is found that the moving coil does not clear the fixed ones, additional washers should be placed in between the spring washer and nut to act as packing pieces. When the position of the moving coil is satisfactorily adjusted it may be secured in position by a nut below which is locked in the usual manner by a locking nut.



The moving coil should be placed in such a position that the pointer on the scale is pointing to zero, when the two coils are immediately over each other.

The two basket coils forming the aerial tuning variometer should be wound with No. 24 D.S.C. or S.S.C. Fifty turns being wound on each former.

### Assembling the Coils.

The variometer forming the anode-tuning inductance should be wound with No. 28 D.S.C. or S.S.C., 70 turns being wound on each former.

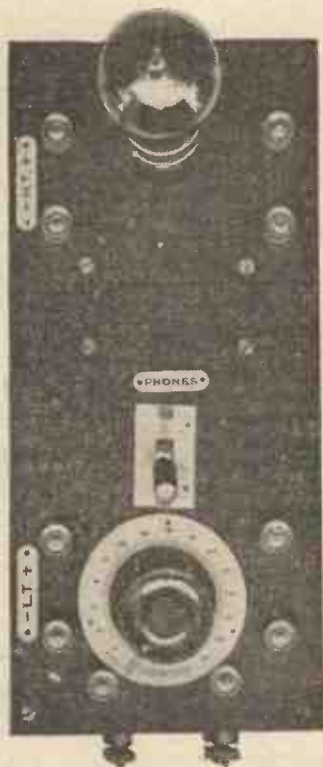
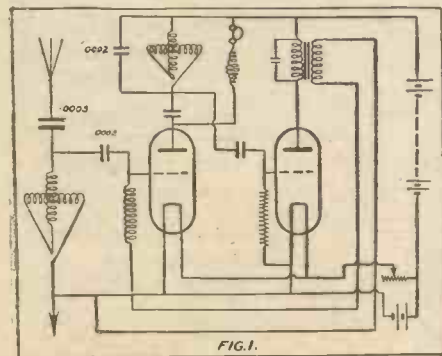
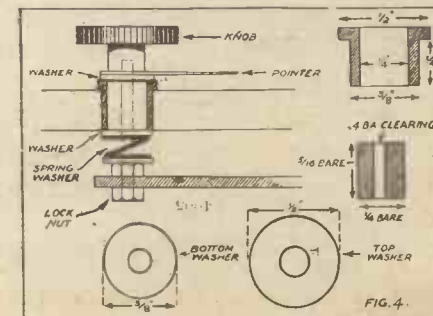
When these two coils are mounted they should be so placed that the direction of winding is the same in both coils as shown in Fig. 5, the two inner ends being connected together by flexible connections. The two coils thus act in opposition when they are over one another, their combined inductance thus varying from a minimum when the coils are over each other to a maximum when they are widely separated.

The number of turns on these variometers will probably require adjustment to get the required range of wave-length, as so much depends on the way in which the coils are wound and the distance between them.

For the fixed .0005 mfd. condenser four foils, each 2 cm. by 1 cm., and five pieces of mica 3 cm. by 2 cm. will be required.

The lay-out of the items will follow the same arrangement in general as the con-

(Continued on page 208.)





# THE "P.W." LONG-RANGE BROADCAST RECEIVER.

(Continued from page 207.)

denser tuned set. A panel 14 in. by 12 in. will be required with a vertical panel 5 in. by 13 in.

The items should be arranged as shown in Fig. 6, the variometers being fixed so that they have a movement of at least 120°.

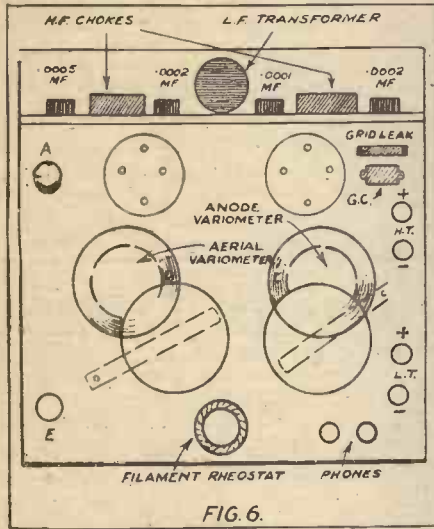


FIG. 6.

The vertical panel carries the high-tension chokes, transformer, and various fixed condensers, as shown.

The high-tension chokes should be fixed as previously described by an ebonite strip and a bolt and nut clamping them to the panel.

### Loud-Speaker Range.

The wiring should be carried out with No. 20 enamelled wire, this wire being stretched to enable it to take any sets it may be desired to give it. Particular care should be taken to keep the wires as far apart as possible—this is very necessary in all dual circuits, as by the nature of the circuit they are very liable to develop undesired effects due to stray capacities.

The method of wiring the components on the vertical panel previously described should, of course, be followed in this set.

A containing box of the dimensions shown in Fig. 8 should be constructed of 3/8-inch hard wood, the sides and bottom being jointed by dovetailing or pinning as may be desired. The half-inch fillets shown in each corner are provided to give a good fixing for the panel, which should be so drilled as to

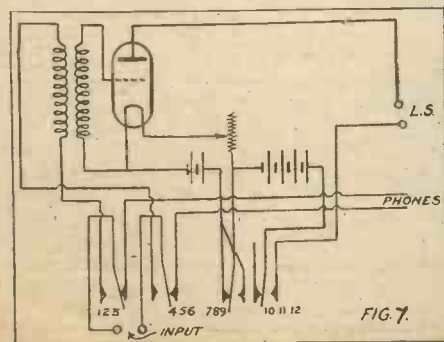


FIG. 7.

permit the holding down screws to be secured to them.

The box may be finished by staining and French polishing, or varnishing.

Whilst either of these circuits will give loud-speaker strength up to a distance of approximately 15 miles from a broadcasting station, and may in favourable circumstances give such signals at a greater distance, amateurs who are not so fortunate as to live within such distances of their nearest broadcasting station will require a further low-frequency amplifier to give loud-speaker strength.

### The Dewar Switch.

The photograph shows a low-frequency amplifier that was designed for use with either the condenser or vario-tuned sets, and which enables the loud speaker or 'phones to be used at will. Use is made of a Dewar switch to effect this change over, and the connections of the set are shown in Fig. 7.

The switch is a two-position one, and it will be seen that in the first position, that in which the key is shown in the diagram, the input from the main set is connected to springs 2 and 3, and 5 and 6 to the 'phone terminals on the low-frequency set. The filament circuit and the high-tension circuit of the valve are broken at springs 8 and 9, and 11 and 12, respectively. When the key is put into the second position, the input terminals are joined to the primary of the low-frequency transformer via springs 2 and 1, and 4 and 5. The valve is lighted through springs 8 and 9 being in contact, and the high-tension supply is joined to the plate via springs 11 and 12, and the loud speaker. This instrument is thus thrown into use, and the 'phones cut out.

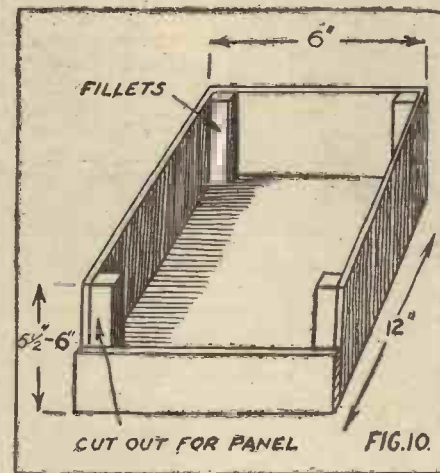


FIG. 10.

The items required for the construction of this set are as follows: one low-tension transformer; one valve holder; one filament transformer; one double Dewar key; six terminals.

### Lay-out of the Panel.

The low-tension transformer may be made as previously described, if it is not intended to use a purchased one. The remainder of the items should be purchased, as they are beyond the capabilities of the average amateur to construct. A suitable key may be obtained very cheaply from ex-Army stocks.

The lay-out of the panel, which should be six inches by twelve inches by 1/4 inch thick, is shown in Fig. 9, and calls for no comment.

Some difficulty may be experienced in mounting the Dewar switch, which is usually fitted with a mounting plate, which has to be mounted flush with the panel. The body of the switch is usually rectangular in section, and necessitates a square hole being provided in the panel. This can be cut by drilling four holes, one in each corner of the rectangle, which should be marked out on the panel and cutting them to shape by careful filing.

It will be observed that a vertical panel is shown at the front edge of the panel, this vertical panel carrying the loud speaker and telephone terminals. It should be composed of a piece of ebonite, 6 in. by 3 in. by 1/4 in., and should be secured to the panel by small brackets, and countersunk screws and nuts as shown.

Wiring should be carried out with No. 20 enamelled, and particular care should be taken in soldering the leads to the tags of the Dewar switch to prevent short circuits.

The box is shown in Fig. 10; it should be constructed of 3/8 in. hardwood, and finished to match the main set.

The front of the box will consist of a short piece extending 3 in. from the bottom, and this will have to be recessed 1/8 in. into the sides to allow of the vertical panel which is 1/4 in. thick lying flush with this piece of wood.

The usual 1/4 in. square fillets are allowed for, to enable the panel to be firmly secured to the box. Two screws should also be put through the vertical panel into the front fillets to secure this panel to the box satisfactorily.

Owing to unforeseen circumstances there has not been the opportunity of carrying out the many tests made in different districts that were carried out with the "P.W." Combination Set, and the Editor would welcome details of the results obtained with any sets of this type constructed by readers of this journal.

Sufficient tests have been made to be certain of the satisfactory working of the set, and both the R type and the dull emitter type of valves have been tried, so that the circuit can be unhesitatingly recommended.

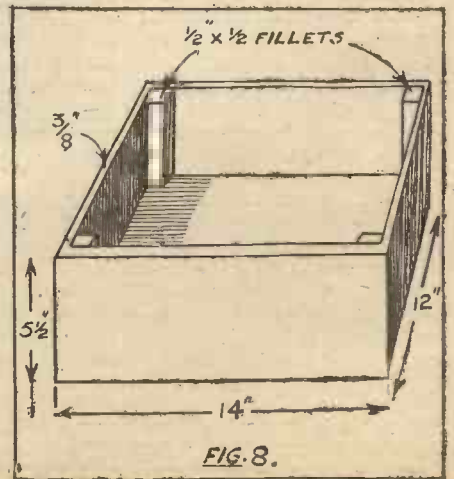


FIG. 8.

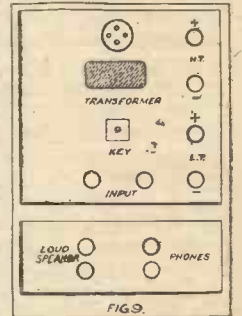


FIG. 9.



# Mainly About Broadcasting

by The Editor

THE other day I read an article in the "Daily News" by Mr. Robert Lynd, whose essays and articles are such a distinguished feature of that journal.

But in this particular article Mr. Lynd revealed himself in a curious mood; he apparently revolts at the idea of the voice of the nightingale being broadcast by wireless!

It seems to him to be an "extremely immoral proposal that people should be allowed to listen to a nightingale who will not put themselves to the trouble of going out to listen to a nightingale."

Indeed, Mr. Lynd far prefers to play Bach's Goldberg Variations on his pianola to "listening-in."

## Nature's Concerts.

And no doubt it is an extremely immoral thing that so many hundreds of thousands of boys and girls and poor people in our slums should be unable to treat themselves to a trip into the country to hear the voice of the nightingale.

Unfortunately, there are these thousands of people, excluding the aged and infirm, the inmates of hospitals, and others, whose only chance of hearing one of Nature's concerts is to hope that the B.B.C. will go on with their scheme for broadcasting the songs of birds, the music of the surf on the seashore, and other effects from Nature's orchestra.

## The Touch of Romance.

Perhaps Mr. Lynd, in common with many other people in more comfortable circumstances than many of their fellows, does not realise the great boon broadcasting has been to poor people.

Statistics show that, in London alone, there are more aerials erected in the East End than in any other part of the capital; that cheaply constructed or purchased "crystal sets" are cherished, as Aladdin cherished his magic lamp, by the East End boys and girls, aye, and by their fathers and mothers.

To all of them broadcasting has brought a touch of romance into drab and dreary lives. The magic of the Children's Hour has, in the opinion of an East End clerical friend of mine, done more to keep children from the streets and to infuse in them a sense of romance and beauty than a dozen mission schools, a hundred Salvation Army bands, and all the so-called playground centres put together.

And so, perhaps, Mr. Lynd will not begrudge them the voice of the nightingale by wireless, even though the mere thought of it offend his æsthetic senses. At least he can console himself with the Goldberg Variations on his pianola.

## Better English.

Dr. Robert Bridges, the poet laureate, sees in broadcasting a potent medium for the improvement of the English language,

and it is an undoubted fact that the broadcasting service in this country has already done much to improve the accent of children of the poorer classes.

In the past they spent their evenings in the streets or parks, often rowdy and careless of speech; but now, the telephones glued to their ears, they listen to the magic voices from 2 L O, and reap much profit thereby.

Only the other day I happened to be walking along a suburban road and overheard an exchange of compliments between two young urchins. Strangely enough, their quarrel apparently centred on the respective merits of their wireless sets.

his readers know that he does not intend to join the happy ranks of listeners-in.

And again, only a few days ago I was surprised and not a little pained to find "John o' London" (Mr. Wilfred Whitten) addressing a letter to Gog and Magog in the journal that bears his name, which was hardly a fair criticism of broadcasting or the B.B.C.

Gog and Magog are most certainly long defunct personages, but nevertheless, even a letter addressed to the departed may sometimes react on the living, and "John o' London" has probably done the art of broadcasting no small ill-service by means of his facile pen.

Besides Gog and Magog there once lived another curiously named personage—Og.

Og, Gog, and Magog were three giants who, together with Xit the dwarf, lived in the Tower of London in the reign (I believe) of Queen Elizabeth. Now, it is quite on the cards that Gog and Magog, when they get their weekly letter from Mr. Whitten, will show it to their companions, Og and Xit. Xit was a mischievous little brat when alive, and even dead I cannot imagine him a reformed character. He will probably advise the shade of Queen Bess to refrain from buying a broadcast set; or else he will plot an evasion of the B.B.C. tax on the grounds that he and his friends are now a part of the Ether of Space.

## A Suggestion.

Anyhow, all joking apart, it is a great pity that three of our most popular essayists in the journalistic world should disdain broadcasting, and worse still, should disdain it in print on what I cannot help feeling to be a real lack of experience and knowledge of the charms of broadcasting.

It is an old saying that every man is entitled to his own opinion; but first he should acquire a certain amount of information in order to form an opinion, especially if he intends airing it in print.

I hope the trio of essayists I have referred to in this article will investigate broadcasting a little more closely and a little more tolerantly in future, before they venture into print again with articles so aloof and disdainful of broadcasting.

## The King's Speech.

The news that the King has consented to have his speech at the opening of the British Empire Exhibition at Wembley on April 23rd broadcast has been welcomed by owners of wireless sets all over the country. The British Broadcasting Company have made up their minds that the King's voice shall be heard by as much of "the Empire" as possible, and it is more than likely that the King's speech will be heard, not only in this country and all over middle Europe, but as far afield as Canada, America, South Africa, and even in parts of India.



Mr. Sanger-Shepherd, who will probably demonstrate the wireless transmission of photographs at the Wembley Exhibition.

"Garn!" said one, "honeycomb coils are no good for your set."

"—," said the other, "and what about your 'something' reaction coil?"

## Other Critics.

Doubtless the gist of this conversation is coarse to the minds of many, yet the cultured way in which those two boys exchanged views, even in the heat of temper, was an unconscious compliment to the B.B.C. announcers. One might have imagined public schoolboys indulging in advanced slang, as far as accent went.

So I hope Mr. Lynd will not mind 2 L O broadcasting the nightingale's voice. After all, he need not listen to it, and there is always the pianola. And I am not sure that before very long many listeners-in in the East End will enjoy the Goldberg Variations, too—only by wireless.

Mr. Lynd is not the only writer of note who has recently indulged in a tilt at broadcasting. "The Londoner," in the "Evening News," recently delivered himself of some charming pedantry concerning wireless broadcasting, and was at some pains to let



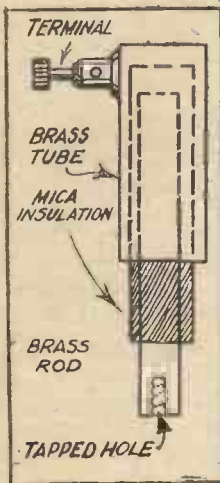
# CONSTRUCTIONAL NOTES.

CONDUCTED BY J. H. T. ROBERTS, D.Sc., F.Inst.P.

## Useful Grid Condenser.

THE grid condenser illustrated herewith has the advantages that it is variable and moreover extremely robust—a quality which is not commonly possessed by these small condensers. It is formed essentially of a central brass rod, covered by a thin layer of mica, upon which, in turn, is fitted a thin brass tube. A terminal is soldered to this brass tube, which forms one terminal of the condenser. The opposite end of the central brass rod may be drilled and tapped, so as to permit of the insertion of a

terminal shaft or, on the other hand, the condenser may be secured by screwing the central rod (by the drilled and tapped hole) upon a set-screw on the panel. The capacity of the condenser may be varied by sliding the tube along the mica covering of the rod.

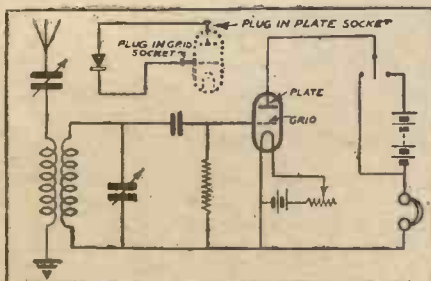


## Crystal and Valve Change-over.

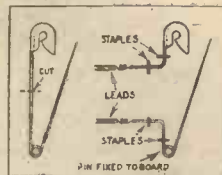
In case anything goes wrong with the valve or crystal, it is very useful to be able, to change over from one to the other. A simple arrangement by which this can be done is that indicated in the accompanying figure. (Br. Pat. 185,102.) The crystal detector, complete, is arranged upon a mounting, with pins to fit the valve-socket. A switch is included in the circuit, by means of which the H.T. battery can be cut out when the crystal is in use. In a modification of the arrangement, a switch is fitted to the valve-socket, the crystal mounting being so arranged that this switch is automatically operated on plugging in the crystal mounting. This saves the trouble of attending to the switch, and avoids consequences of forgetting to do so.

## A Makeshift Switch.

If you are working on an experimental lay-out, making your first rough experiments, and you find you haven't any spare switches amongst your stock of miscellaneous components, a simple "switch" which

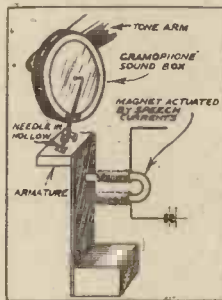


will serve quite well for temporary purposes may be made from a safety-pin. This may be cut into two parts, and the parts secured to a base-board by small staples. In order to prevent the two parts from shifting or rotating, it is better to bend a short piece of each, by means of pliers, into a direction roughly at right-angles to the main part, and then to secure with staples, placed as shown in the figure. The leads are soldered to the two parts of the safety-pin, the switch being "on" when the pin is "fastened." If you haven't even a safety pin handy, a switch of this kind can be improvised from wire, but the safety-pin is useful, since it is made from stiff wire and is already formed into the required shape.



## Loud Speakers.

An arrangement by which the acoustical reproducing system of a gramophone may be made use of for the purposes of a wireless loud speaker is that shown in the diagram, which forms the subject of patent 202,953 of the Gesellschaft für Drahtlose Telegraphie. A vibratory armature is suitably supported and is actuated by an electro magnet, through the coils of which flow the speech-currents. The needle of the gramophone soundbox rests in a small depression in this armature, and is thus actuated in accordance with the armature. The sound is then reproduced through the gramophone trumpet.



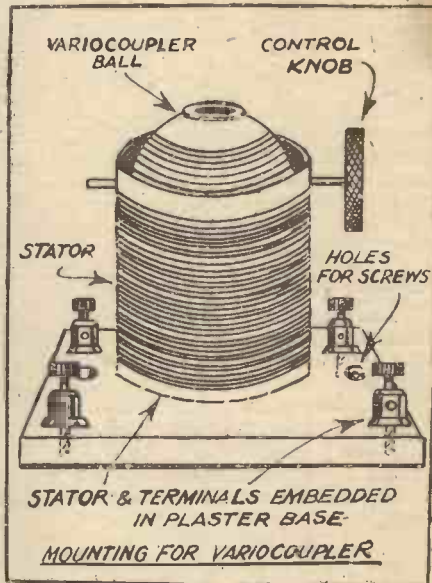
## Fixing and Tuning.

Owing to the fact that in using a variable condenser you have an unbalanced weight on one side of the shaft, the tuning is apt to be upset by the gradual rotation of the shaft. There have been various devices introduced at different times, designed to overcome this trouble, most of them depending upon the use of friction in some way or other. A very simple method, however, is to introduce a balancing weight. This is done in the following way. At the back of most dials there is a hollow or countersunk space. Now if a small piece of lead sheet be fixed, by means of small screws, into this space, it will act as a balance weight for the movable vanes of the condenser. The weight of the vanes can be roughly estimated first, and lead sheet taken of approximately the same weight. The final adjustment can be made by cutting away the lead by means of a penknife, until exact balance is obtained. This will be indicated by the fact that there

is no tendency for the dial to rotate when the table is shaken or banged, no matter in what position the dial is set. Even if the condenser is fitted with a friction brake, this counter-balancing will be an advantage.

## Mounting for Vario-Coupler.

Since the base of the vario-coupler need not be of specially good insulating material, it is unnecessary to employ ebonite or hardwood, and the trouble of working these may be avoided by using plaster of Paris, which



is moulded with extreme ease into any shape which may be desired. The material has the further advantage of being very cheap. The base of the stator of the vario-coupler should be inserted into the plaster before the latter "sets," and the terminals should similarly be set in before the hardening. The holes for the screws which are to secure the vario-coupler should be made by moulding, but if this precaution has been omitted, it is comparatively easy to drill them afterwards, care being taken not to crack the plaster.

## Peanut Valves.

Now that the "dry cell" valve is coming into such great favour, it is well to remember one or two little things with regard to the use and abuse of the dry cell.

An accumulator will generally give a robust protest if it is short-circuited, or the two ends connected together through a low resistance; but a dry cell will suffer in silence with more disastrous results to itself.

The grouping of four "bell ringing" dry cells to light up the one to two volt peanut type is generally achieved by putting two pairs of cells connected in series, into parallel connection with each other.

## Celluloid Varnish.

It is not generally known that celluloid varnish makes an excellent insulating varnish, and can be used in place of shellac varnish. If made with acetone it dries comparatively quickly. It combines high insulating properties with a beautiful gloss and strong "body," and, as it is transparent, it does not mask the original colour of the coil or part treated.







# A USEFUL ADDITION TO A CRYSTAL SET.

By "GALENA."

With the arrangement described in the following article our contributor is able to operate a loud speaker with one L.F. Valve although it must be added that he is within a few miles of 2 L.O.

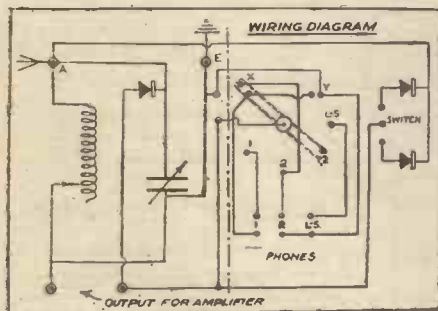
AS a rule, a crystal set can only operate with sufficient loudness a couple of headphones at a time, more are apt to render the sounds received rather too faint to be heard with comfort unless an L.F. amplifier be added. Sometimes a listener may wish to have the full strength of 'phone current received and use but one pair of 'phones; or, again, he may want to disconnect the headphones and switch on the loud speaker for the benefit of all and sundry.

Again, as crystals so often get out of adjustment, a thing which frequently happens just when something interesting is being broadcast, it is well to have a spare one or two to fall back on, each having, perhaps, a different brand of crystal for experimental purposes, so some arrangement by which this can be instantly done comes in very handy.

## The "Selecting" Switch.

To meet this want, which I frequently found would be very desirable, the circuit shown in the accompanying diagram was designed, and I had the special change-over switch made for two 'phones and a loud speaker, which answers perfectly. By means of it, Nos. 1 and 2 'phones can be switched on separately as desired, or both together in series, while when the loud speaker is put in circuit they are both automatically cut out.

The arm of the 'phone switch opposite the terminals carries a small contact plate which connects the two pairs of contacts X and Y, at the same time as the other end if in contact with the 'phone studs 1 and 1, 2, those for 'phone 2 alone and for the loud speaker not requiring further connections. The contact plate is fixed



to a bit of ebonite to insulate it from the metal arm on its under side, and by this means a simple movement of the arm makes all the connections necessary when changing over. By its position shown in the diagram both 'phones are in circuit in series.

If desired, this switch can, of course, be made to take more than two pairs of headphones by adding additional studs connected suitably to other back contacts like X and Y, especially if a loud speaker be used

requiring an L.F. amplifier, which could also be employed with the 'phones; but two headphones are all I have found necessary.

To carry this arrangement into effect I mounted my old crystal set in its box on a board, as shown to the left of the dotted line, and arranged the four studs for the 'phones switch in the centre with a pair of extra crystal detectors controlled by a two-way switch "substantially as shown." All connections were made under the board, and the whole outfit has a neat and compact appearance, being kept free from dust by a cover thrown over it.

## Useful for Testing.

As will be seen by the diagram, the original detector on the set is always in circuit, it not having been thought advisable to disturb the internal connections; but when



Showing the new Marconi amplifiers such as are used by station CKAC, La Presse, Montreal, in its own studio and in the radio central opened up January 1st, in the Mount Royal Hotel.

not required it is only necessary to pull back the handle of the cat's-whisker, sending the current through to the control switch for the extra crystal detectors. All three crystals can be tuned in when the B.B.C. buzzer is on, and any one of them used as may be desired.

By this arrangement there is never any interruption of reception, and much information can be gained by experimenting with the innumerable crystal "ites" now on the market.

## SEARCHING THE AMERICAN ETHER.

(Continued from page 211.)

comfortable audibility, although slight fading is generally experienced up till about midnight. This fading is not, however, fading right into inaudibility, but just a momentary weakening of signals which hardly causes a word of speech to be lost.

Now just a few words with regard to the circuits the diagrams of which are reproduced herewith. Fig. 1 is almost self-

explanatory. It will, however, be noticed that no grid leak is shown. This is not an error. It was found difficult to obtain a satisfactory reaction coupling with any reasonable value of grid leak, so this was entirely omitted, and without this, various valves were tried with varying success.

The grid condenser was variable until it was discovered that for most valves .0002 mfd. was quite suitable, so a fixed condenser of this value was introduced into the circuit.

## The "100 metre" Circuit.

Fig. 2 shows a tightly coupled double-circuit receiver with which 100-metre stations can be very comfortably brought in. This circuit is more selective than that shown in Fig. 1, while there is a step-up in potential due to the greater number of turns on the secondary. This has the effect of increasing signal strength. The primary and secondary coils are wound similarly to those which are shown in the diagram on Page 214, the construction being described in the accompanying article.

It will be noticed that the circuit is very similar to the one we use, and, in view of the contributor's statements, ample proof is to hand of its undoubted efficacy.

The reaction coil used in our case consisted of a 100-turn basket coil. It was impossible to obtain satisfactory reaction with anything smaller. The vernier con-

denser, quite a simple two-plate variable, provides a very sharp control of the reaction coupling, and this is advisable on 100-metre work.

Fig. 3, when used with orthodox aerial and earth connections, is practically Fig. 1 with stages of H.F. and L.F. amplification added, and, since the diagram was drawn, similar reaction from the detector on to the A.T.I. has been permanently added, and

very excellent results recorded.

It will be noticed that grid bias is applied to the L.F. amplifying valve grid, and that the H.F. transformer secondary is tuned. This "transformer" consists of two basket coils on a two-coil holder.

## Will it be Possible?

I have little more to record at the moment, and other most interesting work which is at present being carried out by the technical staff, details of which will shortly be forthcoming, prevents us from bestowing anything in the nature of undivided attention on the reception of American broadcasting, but readers may rest assured that if it is possible for us to achieve the task of carrying on throughout the summer months, we shall do so, and give our readers the full benefits of our investigations.

It must not be imagined that we consider it at all probable that the one-valve circuits, or even the two-valve circuits shown in the diagrams, will prove capable of "carrying on" for even another week from the time of writing, but we have just a few germs of ideas, which if they prove the practical propositions that we confidently anticipate, will enable us to "search the American ether" all the year round.



Manufacture of Broadcasting Apparatus

USE OF PATENTS

The pioneer work of the Marconi Company in connection with wireless telegraphy and telephony is well known, and as the result of many years of research work and considerable expenditure, the Company controls numerous patents relating to the manufacture or use of wireless telegraph and telephone apparatus.

The Company is prepared to grant a licence for the use of its patents in connection with the manufacture of broadcasting apparatus to any member of the British Broadcasting Company, Limited.

A large number of firms (including the principal manufacturers) are already so licensed and pay royalty for the use of these patents, and all apparatus manufactured under licence is so marked.

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Whilst hoping that it will not be forced to take legal proceedings, the Marconi Company wishes to give notice of its intention to protect its own interests and those of its licensees, and in cases of infringement the Company will be reluctantly compelled to take such steps as may be necessary to defend its patent rights.

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Special Valves (V.24 Q.X., Q, Wecovalves, Small Power, L.S.2,	

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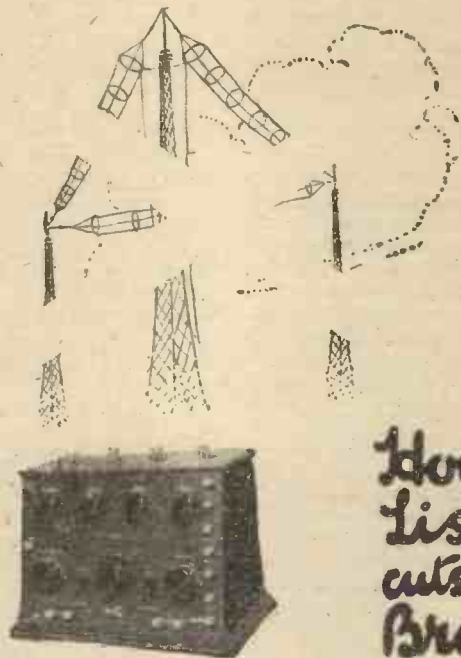
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3.12.23

Dear Sirs,  
It may be of interest to you to know that last night, on my indoor aerial with one of your new 4 Valve Sets, I was able to tune out Glasgow within 4 miles from the Broadcasting Station, and set on direct to Bournemouth and London with such strength as to enable me to switch it through to Loud Speaker. I consider this a very good performance, as it was practically clear from any interruption from the local station.  
Yours faithfully,  
—M.B.

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# K D K A ON ONE VALVE.

It is not always necessary to employ multi-valve sets for the reception of the larger of the American stations, as will be shown by the following article. Simplicity of control is no less important than sensitivity.

THE re-broadcasting of concerts from K D K A by the B.B.C. has given rise to some considerable interest among amateurs in short-wave reception, and has led to a great deal of research work in this connection. The writer has carried out a number of experiments, and has finally decided that the receiver about to be described is the simplest and most efficient of the many he has tried.

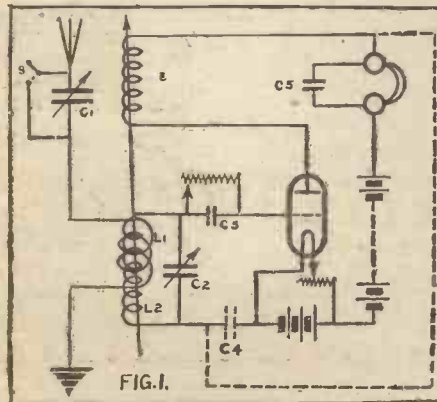
### Tight Coupled Aerial.

The diagram shown is the theoretical wiring diagram, Fig. 1, of the circuit, and it will be seen from this that there is nothing very unusual about its construction. It is in effect an ordinary two-circuit regenerative receiver, but the coils L 1 and L 2 are rather out of the ordinary. These are in the form of basket coils, and are constructed in the following manner. A former is cut from cardboard, as shown in Fig. 2.

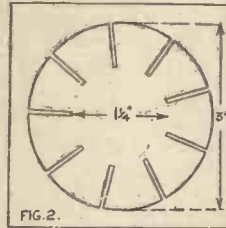
First 8 turns of 28-gauge D.C.C. wire are wound on alone, then the winding is continued for 6 turns simultaneously with 6 turns of 24-gauge D.C.C. wire, and completed with 6 further turns of the 28-gauge wire. About 6 in. at each end of the winding of both wires should be left for connections. There is now the primary, L 1 consisting of 6 turns of 24-gauge wire, and the secondary, L 2, consisting of 20 turns of 28-gauge wire. The reaction coil, which is coupled to L1 and L2 in the usual manner, is also a basket coil wound with 30 turns of 28-gauge D.C.C. wire, but the value of this coil is not critical.

### Critical Tuning.

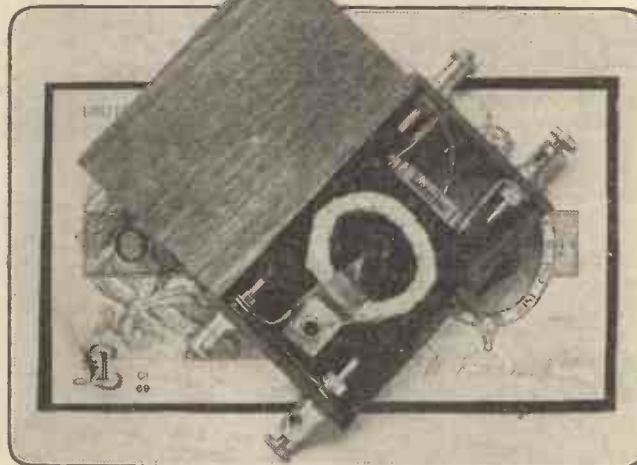
The condensers, C1 and C2 are both variable, being .0005 mfd. and .0002 mfd. respectively, and are fitted with extension handles, as hand capacity is very troublesome in tuning. The condenser, C3, is an ordinary grid condenser, .0002 mfd., being a suitable value, and is shunted by a variable grid leak ( $\frac{1}{2}$  - 5 megohms).



C5 is a telephone blocking condenser (.002 mfd.), but this may not be found necessary.



The switch, S, and the dotted lines show two variations of the circuit. The closing of S makes the aerial circuit practically aperiodic, and may sometimes give very good results with, of course, much facilitated tuning. The dotted connections show how the circuit may be readily changed into a Flewelling circuit for comparative purposes, the fixed condenser, C4, having a value of .006 mfd.



A tiny crystal receiver constructed by Mr. H. E. Ramsfield, 6, Dane Street, High Holborn, W.C.1. Its size may be judged by comparison with the £1 note shown in the photograph.

It must first be ascertained that the direction of the current in each of the coils is the same. Tuning is then accomplished by means of the two variable condensers, the reaction coil, and the filament resistance. All of these adjustments are very critical, so that careful tuning is necessary. Finally, the grid leak should be adjusted to its optimum-value. It is probably advisable to start off with the switch, S, in the closed position.

The writer has been successful at every attempt to receive K D K A, speech being very clear and distinguishable. The aerial used is a "twin" 38 ft. long, and of an average height of 27 ft., situated in mid-London. The valve is an "Ediswan" dull emitter. In addition to K D K A the circuit brought in a good deal of C.W., and some otherwise inaccessible amateur telephony.

of stout cardboard, secured at the edges so as to make a mercury-tight box. One of these discs has a piece of tinfoil pasted inside, slightly smaller than a semi-circle, over which again is pasted a thin sheet of mica the same size as the circular disc of cardboard; the half sheet of foil is thus sealed between a cardboard and a mica disc (a fine wire lead being, of course, connected to it).

A washer of cardboard separates the two outermost cardboard discs, and in the resulting chamber a quantity of mercury is poured, not quite sufficient to reach to the centre when the capsule is in a vertical plane. The mercury forms one "plate" and the foil the other. The mercury will always remain at the lowest level; whilst the foil, which is rigidly attached to the wall of the capsule, may be raised by rotating the capsule. Thus the "engagement" between the foil and mercury may be varied. The large capacity of this condenser is due to the very thin sheet of mica which may be used and to the high dielectric constant of the latter substance.

### Talking Pictures.

An American inventor has secured a patent for an arrangement whereby a broadcast lecture can be received by an audience in a hall and at the same time illustrated by means of a series of slides thrown upon a screen. The voice of the lecturer at the broadcasting station is heard at the hall by means of a loud speaker in the usual way, and the series of slides is arranged in order beforehand.

When the lecturer wishes the next slide to be thrown on the screen he makes a click or other understood signal, which is heard by the lantern operator. In this way the illustrated lecture can be received by any number of audiences, provided each hall is supplied with a set of lantern slides.

### Neon Amplifiers.

It is well known that neon lamps may be made to function as amplifiers, and a great many designs of such amplifiers have been recently brought forward. An interesting

(Continued on page 228.)

## TECHNICAL NOTES

Conducted by Dr. J. H. T. ROBERTS, F. Inst. P.

### Mercury Condenser.

THE mercury condenser does not seem to be so well known on this side as in America. It has certain important advantages, the chief of which is its extremely small size for a given capacity. This condenser consists essentially of a circular capsule, arranged in a vertical plane, and supported on the end of a horizontal arm, by means of which it can be rotated so as to vary the capacity.

The capsule may be, say, 3 inches in diameter, and may be made from two discs



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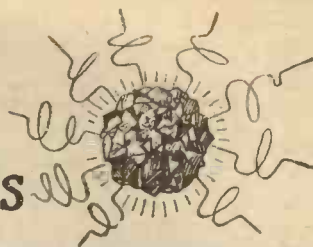
The Battery illustrated is designed for use with the valves with filament voltage of 2.4 to 3 and current consumption of .06 amps. Insulated terminals are fitted at 0, 3, and 4.5 volts.

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No. L.T.3 . . . . . Price 7s. 6d.  
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*I Told You So*



How you hate him for reminding you of that—yet you know that if you had taken his advice in the first case your set would not be suffering from "dead earphones." The golden advice in wireless reception is the scrupulous attention to details—they are the things that matter. We mean this—if the wind blows your aerial down the cause of no reception is rather obvious, but if a little connection comes "unstuck" somewhere in the vitals of your instrument the seat of trouble needs hunting

for (and just when America is coming through). So save yourself further annoyances by carefully overhauling your connections and fix them with solder and FLUXITE. Soldering is the easiest thing in the world to do when FLUXITE is at hand to assist you. **ASK YOUR IRONMONGER OR HARDWEAR DEALER TO SHOW YOU THE NEAT LITTLE**

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# DEVELOPMENT IN DULL EMITTERS.

By SEXTON O'CONNOR.

A prospect of the future: valves in which both plate and filament voltages are supplied from a single dry cell.

**A**N ordinary valve with the filament glowing and the high-tension plugged-in, whilst waiting for the impact of signals upon the aerial, may be regarded merely as an energy-consuming device. In the case of the bright-emitter or R type, from 7 to 75 amperes are being driven through the filament at a pressure of 4 volts, representing a power expenditure of approximately 3 watts. This degree of energisation is necessary in order to set free from the filament a sufficiency of electrons to translate any incoming signal impulses into variations of telephone current.

## Low Temperature Valves.

In addition there is a high tension of, say, 75 volts on the plate which, when the aerial is idle, is forcing a steady electron current of two or three milliamps across the space between the plate and filament. This represents a further expenditure of wattage, small in comparison with the first, but necessary in order to direct and control the movement of the liberated electrons along the proper path.

When so energised the valve is able to detect and amplify by some five or six times incoming signal energy of a value that is microscopic in comparison with the energy that is being spent by the valve batteries. This performance is in itself so remarkable as to overshadow, in the first instance, any question as to whether the same result might not be obtained in a more efficient and economical manner.

In course of time, however, various investigators turned their attention to this very point, with results that are now embodied in the various types of dull-emitter valves to be found on the market.

The first step was taken by Wehnelt, who, in 1904, discovered that by coating a platinum filament with lime he was able to produce a more copious emission of electrons than had previously been possible at a given temperature.

## Thoriated Filaments.

After overcoming many difficulties arising from the tendency of the coating to fall away from the metal core, Wehnelt's original discovery has finally resulted in the production of the modern "coated filament" or "wecovalve" type of dull-emitter, in which several successive layers of oxide are welded together by a gold or silver binding upon a platinum-nickel core. It is interesting to remark that as many as sixteen successive coatings of strontium hydroxide and barium resinate have been successfully applied to a single metallic-core filament of this type.

Another important discovery was made in 1918 by Irving Langmuir, who found

that by mixing certain thorium compounds with the tungsten oxide from which the metallic filament was made, an alloy of the two metals was formed which had the peculiar property of emitting electrons freely at a much lower temperature than the pure tungsten. This is the basis of the "thoriated tungsten" filaments, the latest form of which is seen in the well-known '06 type of dull emitter. In certain cases a special carbonising process is used to prevent oxidation of the active thorium element in the process of manufacture.

## Further Progress.

The object of the search for a filament of superior emissivity was, in the first instance, to secure a more plentiful supply of free electrons for a given expenditure of battery power—i.e. at the same filament

of dull-emitter in which the internal space is filled with a metallic vapour, such as that of caesium and rubidium, which apparently forms an atomic deposit or film upon the tungsten filament. This film has the peculiar property of extracting electrons from the filament and setting them free by an electro-chemical process which takes place at a much lower temperature than that required by the normal heat-evaporation effect.

## Elimination of H.T.

In addition, the new dull emitter is stated to operate as a receiver of wireless signals without the use of any plate battery. Although it is somewhat difficult from the details at present available to understand precisely how this is effected, assuming that the usual amplification effect takes place, it is by no means an impossible proposition.

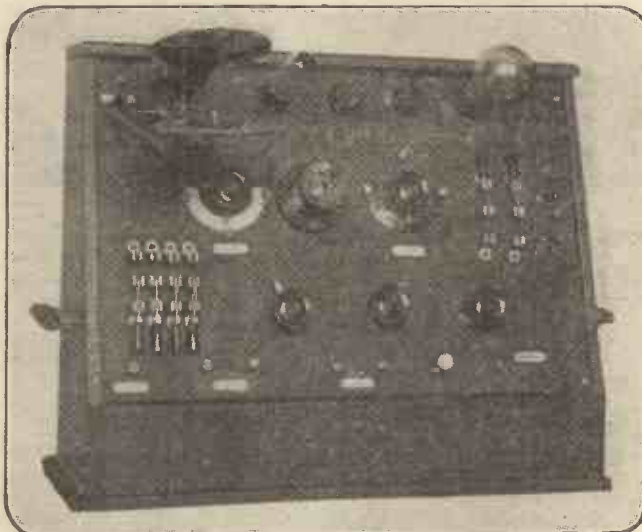
Provided that some source of local energy is present, even though this is no more than a single dry cell, it is quite feasible that enough power could be obtained from that single source to liberate a sufficient supply of electrons from a specially sensitive filament to furnish the necessary relaying or strengthening action.

The application of a high plate voltage in the ordinary valve is necessary mainly because of the high internal resistance of the inter-electrode space, which, in turn, is due to the high vacuum and to the physical construction or geometry of the bulb. Given a filament of extraordinary emissivity and a suitable design and arrangement of grid and plate, the incoming signals alone could so control the passage of the electron stream as to produce a direct strengthening effect in the plate circuit without the application of a special plate battery.

By connecting the plate to the positive side of the filament battery the average potential of the plate can be maintained at a higher value than the average potential of the filament, thus producing a potential gradient operating to control the electron stream. In addition, the plate may be made of a metal having a pronounced electro-positive character so as to exert a further attractive influence upon the liberated electrons.

## Operation from One Cell.

There is no doubt that the production of a valve completely equipped for reception by means of a single dry-cell is well within sight. The elimination of the present expensive and clumsy arrangement of separate high and low tension batteries will be a welcome relief, whilst the new development will furnish to wireless enthusiasts yet another proof of the apparently inexhaustible possibilities of the thermionic valve.



The "P.W." Combination Set (2 units) constructed by Mr. J. G. Portsmouth, of 29, Chamberlayne Mansions, Kensal Rise, N.W.10.

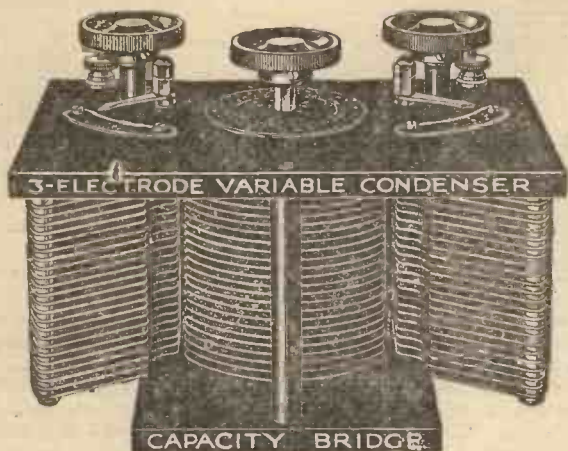
temperature. Once this result had been achieved, the way was naturally opened up to the production of dull-emitter filaments capable of liberating a sufficient electron supply at a comparatively low temperature—i.e. for a much less battery output than that previously required.

For example, it may be mentioned that an ordinary tungsten "bright emitter" filament heated to a white heat corresponding to 2,100° C. by the passage of 75 amperes at 4 volts will emit an electron stream equivalent to 2 amperes per square centimetre of filament.

The original thoriated-tungsten and coated filaments gave an equal emission at a bright-red temperature of approximately 1,000° C., whilst the later type of "peanuts" function equally well at a yellow heat corresponding to a temperature of roughly 700° C., generated by a battery output of only one fifth of a watt.

Still further progress is now reported from America in the form of a new type





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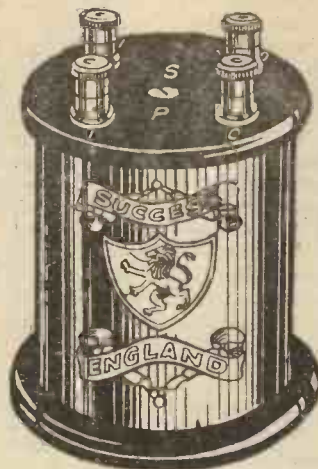
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# Artistes of the Aether

BY 'ARIEL'

Some of the artistes who have given you pleasure while listening-in

IT has become the fashion to sneer at British music, during the last ten years, and the modern British composer has only himself to blame. Forsaking the methods of the real musical genius, such as Sullivan or Edward German, he had looked upon melody as the unforgivable sin, and in consequence we have the turgid meanderings of meaningless phrases, dignified by the name of "phantasy," or "rhapsody," and of which two or three pages at a time could be turned over without being missed. Sonatas, concertos, trios, quartets, and even symphonies are rolled out by the dozen, all difficult to play, boring to listen to, and immediately forgotten. The result is that the average music-lover turns to the work of the foreigner, not on account of his actual love for foreign music, but because in most cases there is a phrase or melody which makes the work easily recognisable again.



Mr. John Ireland.

## Versatile Partners.

That this theory has been proved by the B.B.C. is shown in the plebiscite or request programmes. In which have we been asked for a work of a modern British composer, except the song "Sea Fever," by John Ireland? This composer has been chosen to follow in the series of hours devoted to British composers, and of which Mr. J. B. McEwen, the new President of the Royal Academy, was the first.

John Ireland is an essentially English composer, but his work is free from the turgidness which characterises most modern native music. "Sea Fever," his setting of John Masefield's poem, is the most popular of his songs, and this has been broadcast on many occasions. The Violin Concerto No. 2, played by Daisy Kennedy, with the composer at the piano, was written in 1917, and reflects all the stress and turbulence of the period. Probably most people feel more interest in his songs. "If There Were Dreams to Sell" and "Hope the Horn Blower" are both typical of his style. His versatility is also shown in his works for the violoncello and organ, as well as piano, the three works



Mr. Jack Rickards.

chosen from "London Pieces" being the best known.

Included in the programme of the same night were the names of a clever pair of humorous entertainers, Jack Rickards and Violet Stevens. They have appeared several times before the microphone, and have always played to good advantage. "The Scandalmongers" makes an excellent medium for broadcasted humour. Both artistes are well known at the miscellaneous concerts at the Alhambra, Queen's Hall, Palladium, etc., and throughout the provinces and many seaside towns visited by them.

## A Moot Point.

Mr. Rickards writes all the various turns and subject matter for himself and partner, and a particularly effective show is "Moonstones," run in collaboration with Ernest Sewell. During the war Mr. Rickards had the unique experience of serving in Scottish, English, and Irish regiments, and thus gave him the idea of the "polyglot" songs which have been made such a successful feature by Miss Stevens.

An item that deserves to be questioned on the point of taste is the "service" of the Salvation Army at 2 L O recently.



Miss Violet Stevens.

While admitting the good work done by this estimable body in certain quarters, there is no possible reason why street corner oratory should be literally thrust into the homes of every other religious sect in London. Surely it is a moot point as to whether the B.B.C. is a "place of worship" under the Act.

Friday being pay-night, we can imagine that many listeners indulged in new batteries, fresh brands of crystal, or borrowing a new valve, in case of accidents which will happen, you know, in the best regulated valve set. The reason lay in its being a "John Henry" night, and his name is one to conjure with in London, from the 'bus conductor, who will cheerfully stop on both sides of the road at once if you but mention his name, to the postman.

## A Welcome Return

Humour is indeed the salt of life, and, like that useful mineral, needs to be carefully used. "An Elegant Sufficiency," as the polite young lady expressed her satisfaction with a meal, is enough. 2 L O's brand of humour is apt to be on the "heavy" side, and "child studies" are by this time out of date in most places of entertainment. A welcome return, however, was made last week of R. I. Stephenson, who is one of the best raconteurs possible.

I do not think I shall be wrong in saying that Mr. Stephenson hails from "The Land of Cakes," though he himself puts it that he is a "Scotch Cockney from Dublin." Frankly judging from the way he can tell dialect stories, it would be hard to say to what nationality he belongs, for each is a gem in itself. To those who like the slapstick kind of humour, Mr. Stephenson probably may not appeal. His humour is witty, as one would expect from a graduate of Victoria University, clean and virile—in fact, humour at its best. He is a good sport, too, obtaining his colours at college for soccer and playing in countless teams against the League and the Corinthians. Any of those listening-in in future can give an extra clap when Mr. Stephenson "attacks the microphone" again. Apart from his football prowess, Mr. Stephenson admits a weakness for golf and billiards, which he can play two hours without a break.



Mr. R. I. Stephenson.

## The 6 B M Trio.

The provinces have scored again, especially in orchestral music. This is not really surprising, for most of the players are recruited from the big provincial orchestras, experienced to play under all conditions. Especially successful has been Bournemouth, where the source, naturally, is the Winter Gardens men, trained under the aegis of Sir Dan Godfrey. Apart from the orchestra "en masse," as it were, excellent work is done by the trios and quartet parties, and very useful has proved the 6 B M trio, Messrs. Reginald Mouat (violin), Thos. Illingsworth (cello), and Arthur Marston (piano). A recent performance by this body of movements from the Arensky Trio would have established them anywhere in the front rank of chamber music players.

Mr. Illingsworth, the 'cellist, is one of the best-known players from the Municipal Orchestra, but it is as a soloist that he is heard to best advantage, for here his broad rich tone and his gift for phrasing are most apparent. He is an authority also on musical theory, and, apart from his own instrument, his hobby is the study of the mechanism of music.



Mr. T. E. Illingsworth



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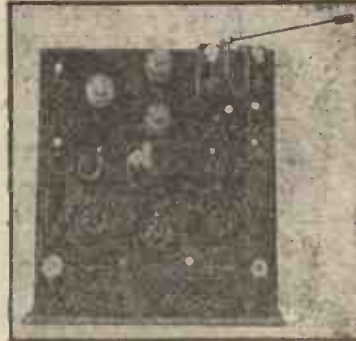
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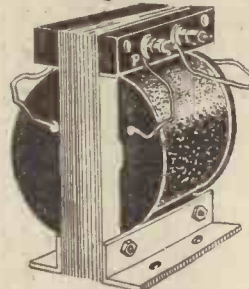
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The Editor will be pleased to publish concise reports of meetings of Wireless clubs and associations, reserving the right to curtail the report if necessary. Hon. secretaries are reminded that reports should be sent in as soon after a meeting as possible. Reports sent in cannot appear in this paper in less than ten days after receipt of same. An asterisk denotes affiliation to the Radio Society of Great Britain.

**Radio Society of Great Britain.**

On Thursday, March 13th, the weekly talk of this society was broadcast from 2 L O. The speaker was Mr. J. F. Stanley, honorary secretary of the General Committee of Affiliated Societies.

Mr. Stanley referred to the importance of the recent Annual Conference of Affiliated Societies, and made a few interesting announcements.

Hon. sec., P. R. Coursey, B.Sc., A.M.I.E.E., F.Inst.P., 53, Victoria Street, S.W.1.

**North Middlesex Wireless Club.**

At a meeting of the above club held at Shaftesbury Hall, Bowes Park, N., recently, the proceedings were opened by an account by the chairman, Mr. A. J. Dixon, of the business transacted at the Annual Conference of the Wireless Societies. Mr. Dixon described the steps which had been taken to secure for affiliated societies better representation on the Radio Society of Great Britain.

Hon. sec., H. A. Green, 100, Pellatt Grove, Wood Green, N.22.

**The Yeovil and District Radio Society.\***

The above society has been recently formed and several meetings held: The business of starting the society on a proper basis has been duly carried out, officers elected, and meetings arranged for every alternate Wednesday evening at 7.30.

Joint hon. secs., Mr. R. J. W. Marr, Kismet, Sherborne Road, Yeovil; Mr. W. J. Hall, Greenhill, Sherborne.

**Hornsey and District Wireless Society.\***

On Monday, March 10th, by the kind permission of Messrs. The Peto-Scott Company, Ltd., Mr. R. J. Willis gave a lecture and demonstration on the subject of "Assembling Valve Receivers on the Unit System."

Hon. sec., Mr. H. Hyams, 188, Nelson Road, Hornsey, N.8.

**Radio Association.**

Members will no doubt be interested to know that the April Bulletin is to be broadcast by Mr. Geo. Sutton, A.M.I.E.E., F.R.A.

It should be well known by now that membership is open to all connected in any manner with the science of radio.

It is the claim of the association that its membership is the largest of any radio concern in the United Kingdom, and that its activities cover every phase of radio science with corresponding greater benefits to Radio Association members.

The hon. sec., Mr. S. Landman, M.A., is at the service of all who are interested, and will be only too pleased to forward details of membership, privileges, etc. Send him a card, the head office is Sentinel House, Southampton Row, W.C.1.

**Bethnal Green Radio Society.**

A number of members of the above society were afforded the pleasure of visiting the B.B.C.

London station, and a very entertaining two hours was spent in seeing some of the wonders of wireless broadcasting.

Hon. sec., W. Overy, Men's Institute, Wolverley Street, E.2.

**Brockley and District Radio Association.**

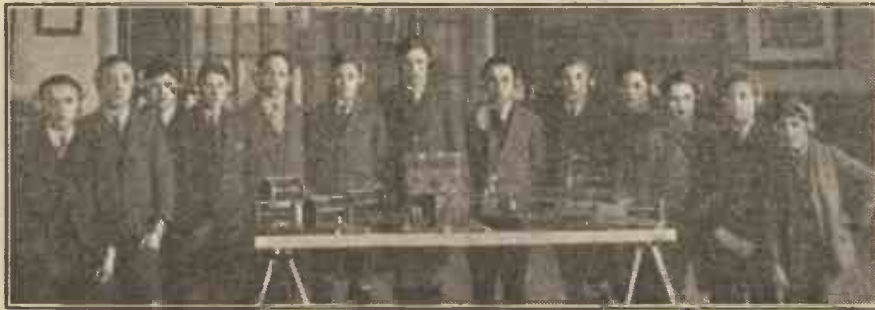
At the meeting of the above association on March 7th, at Gladstone Hall, New Cross, Mr. E. Gilbert gave a paper on "Dual Amplification," and also a demonstration with his own three-valve set.

Hon. sec., Harrie King, 2, Henslowe Road., E. Dulwich.

**The Leeds Radio Society.\***

At the instructional meeting held on March 7th, Mr. D. E. Pettigrew lectured upon "The Possibilities of Crystal Reception in Leeds."

Hon. sec., D. E. Pettigrew, 37, Mexborough Avenue, Leeds.



The wireless class of the Union Street Council School, Maidstone, with a number of sets constructed by the boys.

**Catalogues  
Book Reviews  
Etc.**

ONE of the neatest crystal detectors we have yet seen has been forwarded for trial and inspection by Mr. C. L. Pratt, electrical and scientific instrument maker, of 11A, Rheidol Mews, St. Peter's Street, N.1. It is of the vernier type, and distinctly original in design. The designer has been using one of these in the "P.W." Combination Set for some time with very excellent results, probably owing to the ease whereby the pressure of the cat's-whisker on the crystal may be varied, which is an important factor in this circuit. Once adjusted, there is little chance of the sensitive spot being lost through vibration, which is a common fault with the cat's-

whisker type of detector. Mr. Pratt intends marketing this detector at 2s. 6d., a very fair price, we consider.

We have received from Messrs. Griffin, of 80, Newington Causeway, S.E.1, one of their "Griffin" Ugly Hedgehog L.F. transformers, which retails at 22s. 6d. On test, the instrument proved remarkably efficient, both in first and subsequent stages of L.F. amplification, while its form is sufficiently compact to commend itself to the attention of all amateurs desirous of obtaining a transformer neatly suitable for panel mounting without necessitating provision of an undue case depth. We have always been of opinion that the "hedgehog" type of L.F. transformer provides a method of energy transference that reduces distortion to a minimum, and tests with the above instrument would appear to confirm this.

Quite efficient H.T. batteries may be made by connecting a dozen or so small flash-lamp batteries in series, and if kept dry they have an advantage over the usual type in that a faulty section may easily be replaced. The only difficulty in this method is the connecting of the two poles to one another. To obviate this difficulty, the J.B.B. Trading Co., 49, Avenue Road, Acton, have placed on the market some very useful links which can easily be slipped over two strips of the batteries, and thus make a connection which may easily be undone when required. No soldering is required. These links are sold at 10d. per dozen.

The "Eccentro" crystal detector is, as Messrs. W. Joanes, of 42, Jenner Road, Stoke Newington, N.14, claim, perfectly foolproof in its

operation. We have tested a sample sent in to us for this purpose and have no hesitation in recommending it to all amateurs who do not consider 8s. too much for a really excellent little instrument. The adjustment of the contact is by means of turning a small black knob in either direction. This operates an ingenious eccentric device which fully explores every portion of the surface of a crystal with varying pressures. The adjustment is quite "vernier" and although the detector is completely enclosed the crystal can be changed in a few seconds.

After sixteen months of research under the supervision of W. Bension, F.C.S., and T. Hadley, B.Sc., at their Cale Street (Chelsea) Laboratories, G. Street & Co., Ltd., have produced a new crystal which goes by the name of "Neutron." Every piece is tested before dispatch for complete sensitivity and strength of reception. On trial we obtained very satisfactory results with a piece of Neutron. Samples, packed in airtight boxes, may be obtained, together with a silver cat's-whisker, for 1s. 6d. post free, from the Neutron Co., Dept. A, Sicilian House, Southampton Row, W. C.1.



# RADIOFORIAL.

All Editorial Communications to be addressed The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

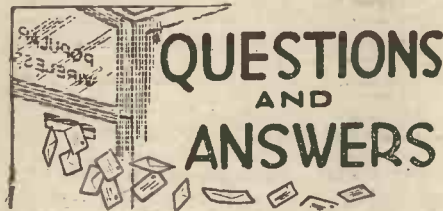
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The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All contributions to be addressed to The Editor, POPULAR WIRELESS AND WIRELESS REVIEW, The Fleetway House Farringdon Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Life, Ltd., 4, Ludgate Circus, London, E.C.4.

The Editor desires to direct the attention of his readers to the fact that, as much of the information given in the columns of this paper is of a technical nature and concerns the most recent developments in the Radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## PATENT ADVICE FOR READERS.

The Editor will be very pleased to recommend readers of POPULAR WIRELESS who have any inventions to patent, or who desire advice on patent questions, to our patent agent. Letters dealing with patent questions, if sent to the Editor, will be forwarded to our own patent advisers, where every facility and help will be afforded to readers.



N. T. S. (Sheffield).—What is the operation of a supersonic heterodyne?

Briefly it is a method of reception employed for wave-lengths below 600 metres, and mainly below 200 metres, whereby a great many stages of H.F. amplification may be employed without the usual disadvantages of H.F. amplification that occur when high frequencies are used. Self oscillation is so prevalent on multi-valve H.F. amplifiers on low wave-lengths that more than two stages are practically impossible if any degree of efficiency is to be obtained.

The super heterodyne does away with this trouble in a novel yet simple way. An ordinary receiver, H.F. and detector, or detector alone, is used, but the incoming oscillations are heterodyned by a separate one-valve oscillator at a frequency corresponding to about 3,000 or 5,000 metres.

This heterodyned energy is practically rectified by the detector, thus eliminating the very high frequency oscillations of the original signals. The resultant signals are then passed through an H.F. transformer tuned to their frequency (3,000 or 5,000 as desired), and then through as many stages of H.F. amplification, resistance, or aperiodic transformer coupled as desired to another detector valve, where they are finally rectified. After this they can be magnified by L.F. amplifiers as desired.

W. U. L. (Monmouth).—I have been told that my set has a great deal of "lag" with regard to reaction. Is this detrimental, and what does it mean?

"Lag," or "overlap," as it should be called, is due to unsuitable components, such as grid leak, reaction coil, or unsatisfactory plate voltage and filament current. The lag is noticed when the reaction coupling is decreased, and the set continues to oscillate though less violently, emitting a rushing sound in the 'phones. This means that it is difficult to control the receiver at its most efficient reaction coupling, and signals are likely to be distorted. For long distance reception slight overlap is sometimes beneficial, but it should not be more than 5 to 10 degrees of coupling.

A. G. (London, N.E.).—I have been told that ordinary high-frequency amplification is more or less useless on 100-metre work. Is this the case?

Generally speaking, yes; but that does not mean that high-frequency amplifying stages, if properly arranged, do not function on very low wave-lengths.

D. I. (Birmingham).—Does the addition of reaction to a receiver improve its selectivity as well as its range of reception?

Yes, if properly handled, reaction does certainly increase the selectivity of a receiver.

## IMPORTANT NOTICE.

Readers are please requested to note that not more than three queries can be answered in one letter addressed to the Technical Queries Department. Owing to the extraordinarily heavy pressure on this department, readers are requested only to send in questions which they find they cannot possibly solve for themselves. On no account will more than three questions be answered in one letter, and telephone calls and personal calls at this office cannot be dealt with, owing to pressure of work on the technical staff.

A stamped and addressed envelope must accompany all queries. A copy of the questions asked should be kept by the sender, as it is not possible to reproduce the original query when replying. Number your queries 1, 2 and 3, and answers will be given to each item.

A. D. (Northampton).—Although I have placed a .001 mfd. variable condenser on the aerial as well as the .0005 mfd. which is included in my receiver, I am unable to increase my wave-length. Does not adding a condenser have the same effect as adding a coil?

The result would be similar if the extra condenser was placed in parallel, but we should think that you have placed it in series with the aerial and the set. By doing this you reduce the capacity below even the .0005 mfd. you already possess—to .0003 mfd., in fact. In any case, the addition of a loading coil will be preferable to the addition of capacity. Such a coil is placed in series with the aerial and set, not in parallel as in the case of loading capacity.

S.P.D.T. (Felstead).—I have a single-valve set without reaction, and now I wish to add an L.F. valve. How can this be done with a S.P.D.T. switch to cut it out. A basket coil is used for the A.T.I. at present, in a two-way coil holder which I have on hand. Can the other plug of this holder be used for plugging-in a reaction coil and variably coupling it to the A.T.I.?

The accompanying diagram shows the wiring of the single-valve circuit with the L.F. valve added, and a S.P.D.T. switch to cut it out. In the left-hand position the 'phones are placed in the plate circuit of the first valve, and the L.F. transformer cut out, while if the switch is put in the right-hand position, the two valves are in operation. A reaction coil should be placed in the plate circuit of the first valve—i.e. between plate and switch arm. This coil is coupled

(Continued on page 223.)

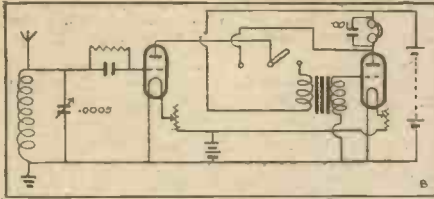


Agitated Householder: "Hello, is that Dr. Jones? Come quickly, my wife is very ill."  
 The Voice (via crossed-line from Biggin Hill): "The 'K D K A Little Symphony Orchestra will now play, 'The Dead March in Saul.'"



## RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 222.)



to the A.T.I. in the two-coil holder, as you suggest, but care should be taken to prevent your set oscillating and causing interference to neighbouring aeriola.

P. J. (Penarth).—At 8.42 p.m. on Wednesday, March 19th, on a wave-length of about 700 metres, I heard a man's voice announcing in English, followed by an orchestra playing what sounded like the Marseillaise. What station was this?

Particulars of this kind are generally of no assistance whatever in tracing a transmission, because of the increasing number of broadcasting stations. Sending and testing are carried on at irregular hours, and often without regard to any published programme. Even when the particulars given agree with the programme of a certain station in point of time and wave-length, there is a possibility of another station transmitting the same item at the same time. This occurs more frequently than is generally supposed, and there is, therefore, only one satisfactory method of ascertaining the name of a station, and that is by making certain of the announcer's statements at the time. If the name or call letters are missed, then a careful note should be made of the adjustments, so that another attempt can be made later. Failing identification at the time, there is no really satisfactory way of naming the station.

"FLATTENED" (St. Leonard's-on-Sea).—I have recently purchased a 3-valve set from a friend who lives about 100 yards away. His aerial is similar to mine (pointing in the same direction, etc.), but the results obtainable with the set are not as good at my house as at his, owing to tuning being flat. Although he could separate the B.B.C. stations quite well, he is unable to do so when the set is attached to my aerial, and signals are somewhat weaker. This latter is probably due to some trees which are near my garden, and which partly screen my aerial; but the loss in signal strength is not so troublesome as the flatter tuning. Is there any easy way by which it might be improved?

Very often tuning can be greatly sharpened by using a series condenser in the aerial instead of the parallel connection. This will need a rather larger aerial coil, and the best condenser value may lie anywhere between .001 and .0005. This method is generally quite effective when the "flattening" is due to a screened aerial, which appears to be the cause in your case.

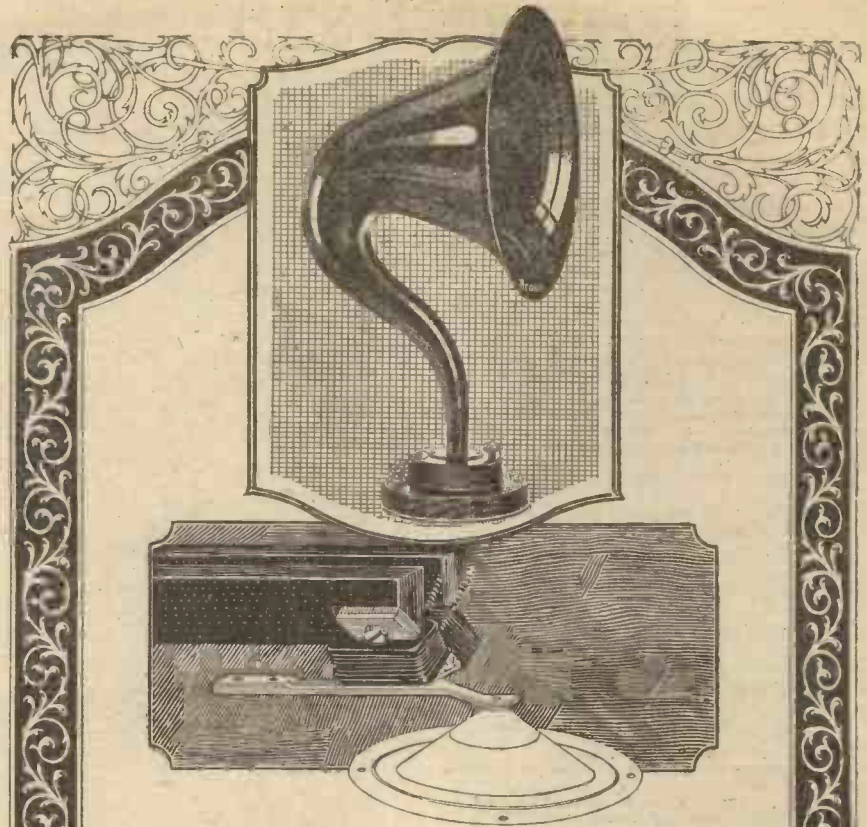
J. R. W. N. (Chancery Lane, W.C. 2).—When constructing circuits from a published diagram, I find that there is generally no type of coil specified, although the number (50 etc.) is generally given. Does this mean that any kind of tuning coil can be used for the circuit, or must I use a honeycomb number 50, although I have basket coils of similar size on hand?

On all ordinary circuits the tuning can be accomplished by any of the various types of tuning coils, and these can be changed over or combined with one another at will.

The difference in the results obtained can only be appreciated by careful comparison, and if the coils are only of approximately the same value, the tuning condenser will generally give the necessary variations for "straight" circuit tuning.

P. L. I. (Oundle).—What are the capacities of the variable and fixed condensers in the reflex and H.F. circuit given on page 16 of the recent free booklet presented with "P.W."?

The following capacities should be employed. Aerial tuning condenser .0005 mfd. Anode condensers, both .0003 mfd. The fixed grid condenser has a capacity of .0003 mfd., while those across the primary of the L.F. transformer and phones and H.F. are both of a similar capacity, namely .001 mfd.



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Remember the purchase of a Loud Speaker is an investment—if you select a Brown you will know that you have chosen the one approved by music critics and those who are in a position to judge.

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### WIRELESS OPERATORS.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have been in communication with other Wireless Training Colleges re the statement you published for the A.W.C.T., and, like this college, I find that these colleges have no difficulty in placing their men in berths when qualified.

I consider that the article you published for the A.W.C.T. was for the sole purpose of creating a shortage of operators, and is a libel on the profession.

In our opinion it has attained the object of its publication, namely, in discouraging youths from taking up wireless telegraphy as a profession.

Some time previously I sent you an article in complete contradiction and asked that you may give my article the same publicity as that of the A.W.C.T.

As there is obviously a misrepresentation of the truth I would consider it an act of justice should you give my previous article full publicity.

I guarantee a berth to every student that qualifies.

There are a number of owners and masters who do not sign on members of this association.

Yours faithfully,

J. R. SCHOFIELD.

The South Wales Wireless Training College, Ltd., Cardiff.

### THE NEW FRENCH STATION.

The Editor, POPULAR WIRELESS.

Dear Sir,—We commenced our Saturday transmission on March 15th, and have asked English amateurs to let us know how they receive us, and have already been inundated with congratulatory reports. Scotch listeners report that they hear the "Petit Parisien" even better than Glasgow and Aberdeen, while several amateurs residing in London state that they receive us better than 2 L.O.

We have every reason to be satisfied with our first transmissions, since we have been heard even in the north of Africa.

Our station was built by the Western Electric Co.; it is situated in our own building, 18, Rue d'Enghien, Paris; we have a three wire aerial, 100 ft. high and 175 ft. long. The power in the antenna is 300 watts.

We do not know when we shall commence regular transmissions because we have yet to arrange the times and length of the programmes with the Post Office.

Yours, etc.,

"Le Petit Parisien."

### THE P.W. SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am writing to let you know the splendid results I am getting with the "P.W. Combination Set" which I have made.

The aerial I am using is wound on a frame 5 ft. by 2 ft., hanging in our loft with a lead to the set of about 12 yards.

The real reason of my writing you is to say that although only about six miles from 2 L.O. I can at any time cut London completely out and receive Aberdeen, also Paris and Birmingham, but 2 L.O. is generally in the background of these two stations.

## FOREIGN STATIONS.

### FRANCE.

Eiffel Tower. F.L. Paris. 2600 metres.—0.40 to 7.0 a.m.; 11.0 to 11.30 a.m.; 3.40 to 4.0 p.m.; 5.30 to 7.20 p.m.; 10.0 to 10.30 p.m.

Compagnie Française de Radiophonie (Emission Radiola). S.F.R. Paris. 1780 metres.—12.30 to 2.0 p.m.; 4.30 to 6.0 p.m.; 8.30 to 10 p.m.; Sundays and Thursdays Radio Dancing at 10 p.m. Close down at 10.45.

L'Ecole Supérieure des Postes et Telegraphes. P.T.T. Paris. 450 metres.—Sunday 8.30 p.m.; Monday 9.0 p.m.; Tuesday 8.0 p.m.; Wednesday 3.45 p.m.; 8.45 p.m.; Thursday, 8.30 p.m.; Friday 8.30 p.m.; Saturday 9.0 p.m.

### SWITZERLAND.

Radio Station Marconi. T.S.F. Geneva. 1100 metres.—Wireless transmissions daily (Sundays excepted) 1.15 to 1.30 p.m.

Lausanne. H.B. 1100 metres.—4.0 p.m. Tuesday, Thursday, Saturday. 7.0 p.m. Monday, Wednesday, Friday, Saturday.

### BELGIUM.

Radio-Electrique, Brussels. 410 metres.—5.0 p.m. Music. 8.30. Concert.

I also receive all other B.B.C. stations, and all very strong.

The set has no other "gadgets" added to it. Using the two units of the said aerial and getting such results, do you consider them good and out of the ordinary?

I have never used this set on an outdoor aerial, but can hear my Amplion loud speaker all over the home! All the mentioned stations are received on unit one, but unit two increases volume greatly.

Wishing your paper every success,

Yours faithfully,

ALBERT H. J. WATTS.

91, Huntingfield Road, Putney, S.W.15.

### THE ONE-VALVE L.S. SET.

To the Editor, POPULAR WIRELESS.

Dear Sir,—I am taking the opportunity to write a few words in support of the reader who is so pleased with the "one-valve loud speaker set," described by you recently.

In the first place, let me say that I believe this is rather an unfavourable spot, as trams run at the front and trains (wide stretches of rails) at the back. Lighting, electric station, ¼ mile away. My aerial is on the roof, about 18 ft. triple wire. I have had unpeep sets. Sometimes we heard well, but after listening to oscillations for a bit, heard no more.

Finally I wired up the one-valve loud speaker set. It is rather louder, a fair amount, than a valve crystal dual, and does away with the instability of detector.

The other night, 2 L.O. being shut down, I heard Cardiff for five minutes, and the following night I heard Glasgow shutting down, a thing I have never heard before at 36 volts plate and more L.T. We can follow music with 'phones on table, but cannot hear every word spoken. The valve crystal worked a small loud speaker, but not loud enough to warrant trying a loud speaker. I have not tried one on this set yet.

Although I have had a set since February, 1923, I have never kept a set more than a month, and this is the best I have had yet. I find the set very critical, especially the secondary condenser, a movement of the hand a few inches away from the set bring sufficient to set up oscillation.

I have also heard Manchester quite clearly.

In my humble opinion more should be made of this circuit.

Believe me,

Yours faithfully,

H. A. JONES.

Herne Hill, S.E.24.

The Editor, POPULAR WIRELESS.

Dear Sir,—Since you published in No. 94 of POPULAR WIRELESS my letter concerning the one-valve loud speaker circuit, described in No. 91 of POPULAR WIRELESS, several correspondents have written to me requesting particulars of the components I used, and how to manage the set.

I used an R.I. transformer, and a Cossor P1 valve with 72 volts on the plate.

I find tuning is exceedingly sharp and selective, and a vernier on the A.T.C. is essential.

Filament control is very delicate, the slightest variation of voltage producing an almost cessation of signals. I recommend one of those carbon compression rheostats for filament control.

My aerial is a single wire, 90 feet long and 35 feet high.

Trusting these facts will help other readers of POPULAR WIRELESS who are contemplating the erection of this circuit.

I remain, yours truly,

R. MANSI.

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Velthuyzen. P.C.K.K.—8.40 to 9.40 p.m. (Friday) Concert.

Amsterdam. P.A.5.—7.40 to 9.10 p.m. (Wednesday) Concert. The above times are all Greenwich Mean Time.

### AMERICA.

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Radio Corporation of America. W.J.Z. New York, N.Y. 455 metres.

Westinghouse Co. K.D.K.A. East Pittsburg, 326 and 102 metres.



**CORRESPONDENCE.**

(Continued from page 224.)

**THE "P.W." SET.**

Sirs,—I received your reply with regard to the H.F. stage on the "P.W." set, which I have constructed and was not working, and I find that what you say about me using unsuitable crystal is quite correct. This seems to me to be a very important point. I may say I have had some very good results from most of the B.B.C. stations. I have also had concerts from the Continent on my "P.W." set.

Yours truly,  
D. WHITEHEAD.

71, Furness Road,  
Fallowfield, Manchester.

**THE WEEK'S BROADCASTING PROGRAMMES.**

**LONDON (2 L O).**

Sunday, April 6th.—Miscellaneous Musical Programme. Mr. R. Kennedy Cox. Address.  
Monday, April 7th.—B.B.C. Literary Critic. Comic Opera Night.  
Tuesday, April 8th.—Russian Programme.  
Wednesday, April 9th.—B.B.C. Dramatic Critic. 4th Symphony Concert.  
Thursday, April 10th.—B.B.C. Music Critic. British Composers' Night.  
Friday, April 11th.—B.B.C. Film Critic. Rossini Programme.  
Saturday, April 12th.—Orchestral Night.

**BIRMINGHAM (5 I T).**

Sunday, April 6th.—The Metropolitan Works Band. The Rt. Rev. William Temple, D.D. Address.  
Monday, April 7th.—Mainly from London.  
Tuesday, April 8th.—Miscellaneous Programme.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Popular Programme.  
Friday, April 11th.—Special Request Programme.  
Saturday, April 12th.—Musical Comedy Night.

**CARDIFF (5 W A).**

Sunday, April 6th.—Organ Recital from the Capitol Cinema. The Rev. R. H. Lomas. Address.  
Monday, April 7th.—Mainly from London.  
Tuesday, April 8th.—West Country Night.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Feature Programme.  
Friday, April 11th.—The Magic Carpet.  
Saturday, April 12th.—The Cory Silver Band.

**MANCHESTER (2 Z Y).**

Sunday, April 6th.—Brahms Concert. The Rev. T. Paton Williams. Address.  
Monday, April 7th.—Concert Party Night. Spanish Talk.  
Tuesday, April 8th.—Light Orchestral Night.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Instrumental and Vocal Concert. Spanish Talk.  
Friday, April 11th.—Popular Concert.  
Saturday, April 12th.—Mirth and Melody night.

**NEWCASTLE (5 N O).**

Sunday, April 6th.—The Newcastle Cathedral Quartette. The Rev. T. Robson. Address.  
Monday, April 7th.—Mainly from London.  
Tuesday, April 8th.—Orchestral Night.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Mendelssohn Evening.  
Friday, April 11th.—Musical Comedy Night.  
Saturday, April 12th.—Popular Evening.

**BOURNEMOUTH (6 B M).**

Sunday, April 6th.—Organ and Cello Recital from the Boscombe Arcade. The Holy Trinity Church Choir. The Rev. R. F. Peachey. Address.  
Monday, April 7th.—Popular Night.  
Tuesday, April 8th.—The Royal Bath Hotel Dance Orchestra. Night of light music.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Chamber Music Night.  
Friday, April 11th.—Popular Night.  
Saturday, April 12th.—Classic Night.

**GLASGOW (5 S C).**

Sunday, April 6th.—The Rev. O. P. Revely. Address. The Westbourne Church Choir.  
Monday, April 7th.—Mainly from London.  
Tuesday, April 8th.—Play Night.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Request Night. The Glasgow University Choral Society.  
Friday, April 11th.—Recital of Chamber Music.  
Saturday, April 12th.—Dance Night.

**ABERDEEN (2 B D).**

Sunday, April 6th.—The Rev. John Guthrie. Address. Orchestral Concert.  
Monday, April 7th.—Mainly from London.  
Tuesday, April 8th.—Orchestral Night.  
Wednesday, April 9th.—Mainly from London.  
Thursday, April 10th.—Operatic Night.  
Friday, April 11th.—Literary Night.  
Saturday, April 12th.—Dance Night.

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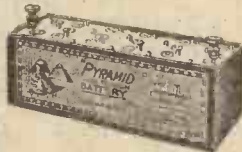
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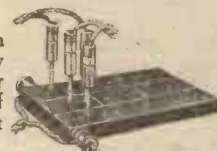


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2AGP	---	S. Meadowcroft ..	44, Carr Drive, Fallowfield, Manchester.
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2AOS	---	A. E. Oliver ..	2, Salisbury Street, South Shields, Durham.
2JA	---	---	Bryn Haf, Litchard, Bridgend.
2IT	C.W., I.C.W., and Telephony.	E. White ..	16, Cliff Terrace, St. John's, S.E.8.
2QT	---	C. C. Barnett ..	Winton Cottage, S. Perrott, Mesterton, Som.
2SF	T.T., C.W., and Telephony	C. Midworth ..	"Sumia," Ridgeway Road, Caterley, Middlesex.
2VY	---	Raymond Ely ..	Highlands, Brighton Road, Sutton.
2WY	---	Herbert J. Swift ..	Kassala, 77, Upper Tulse Hill.
5CC	Spark 180 metres, C.W., & Telephony	A. Wm. Young ..	Bath Electric Plating Works, Foxcumbe Road, Bath.
5CF	T.T., C.W., and Telephony	F. G. S. Wise ..	12, Crouch End Hill, Crouch End, N.8.
5CS	---	G. R. Garratt ..	35, Abbey Road, N.W.8.
5FI	C.W. and Telephony	H. D. Webb ..	59, Bradford Street, Walsall.
5FR	Spark, C.W., T.T., and Telephony	J. L. Jeffrey, F.R.A.	191, St. James' Road, Croydon.
5FZ	---	Lincoln and District Amateur Wireless & Scientific Society	Lincoln Technical School, Lincoln.
5JG	C.W. and Telephony	R. F. Longley ..	Kilworth, 81, Longdale Road, Thornton Heath, Surrey.
5LS	T.T., C.W., and Telephony	R. W. H. Bloxam ..	99, Old Dover Road, Blackheath, S.E.3.
5NP	Telephony and C.W.	Eric P. Burgess ..	2, Queen's Road, Manningham, Bradford
5NU	C.W. and Telephony	H. L. Thomson ..	100, Old Fallow Road, Cannock.
5OD	---	Ralph Bates ..	Holmside, St. Catherine's, Lincoln.
5S	---	C. Bedford ..	Turton Hall, Gildersome, near Leeds.
5TZ	C.W. and Telephony	W. G. Sheratt ..	11, Bath Road, Cowes, Isle of Wight.
5UM	---	H. Allechin ..	78, Chester Road, Forest Gate, E.7.
5VK	C.W. and Telephony	Bernard Caldwell ..	Caverswall, Lower Walton, nr. Warrington.
5WM	Spark, C.W., T.T., and Telephony	J. B. Renshaw ..	Wireless House, Old Chape St., Blackburn.
6AA	C.W., T.T., and Telephony	Durham and Northumberland Collieries Fire and Rescue Brigade	854, Scotswood Road, Newcastle-on-Tyne.
6AB	C.W., T.T., and Telephony	Ditto (portable set)	854, Scotswood Road, Newcastle-on-Tyne.
6AG	C.W., T.T., and Telephony	W. H. Fortington ..	237, Dudley Road, Rotton Park, Birmingham.
6BB	C.W.	John Bolt ..	Crouchley, Lymn, Cheshire.
6CC	C.W. and Telephony	David Burne-Jones ..	Gwalia, Rustic Avenue, Streatham, S.W.16.
6CW	---	Burne-Jones & Co.	Montford Place, Kennington Rd., S.E.11.
6DP	Telephony ..	Norman Crowther ..	219, Roundhay Road, Leeds.
6DW	C.W. and Telephony	D. H. Johnson ..	131, Clapton Common, E.5.
6GZ	---	R. C. Neale ..	Farnborough Road, Farnborough.
6HD	C.W. and Telephony	National Wireless & Electric Company	Church Road, Acton, W.3.
6HV	---	W. J. Butler ..	15, Algernon Road, Edgbaston, B'ham.
6KK	---	J. Cookson ..	66, Albert Road, Blackpool.
6KR	---	G. A. Hutchings ..	866, Ferskone Road, Selly Park, B'ham.
6MJ	C.W. and Telephony	H. A. Freer ..	110, Humberstone Drive, Leicester.
6NF	Duplex Telephony, C.W. and I.C.W.	A. D. Gay ..	49, Thornlaw Road, W. Norwood, S.E.27.
6NH	C.W. and Telephony	J. W. Davies ..	Doddington, Catterham, Surrey.
6NP	C.W. and Telephony	William Gill ..	7, Church View, Heckmondwike.
6NQ	Spark, C.W., I.C.W., and Telephony	L. B. Parkes ..	192, Lichfield Street, Walsall.
6NS	---	Jas. Fraser ..	7, Providence Place, Wellington Street, Fellington-on-Tyne.
6OV	---	H. W. Webb ..	37, Markhouse Avenue Walthamstow, E.17.
6PJ	Telephony ..	F. Ison ..	47, Orford Road, Walthamstow, E.17.
6PK	C.W., Telephony, and Spark	Universal Radio Co.	129, New Bridge Street, Newcastle-on-Tyne
6PL	---	J. F. Brockbank ..	51, Palatine Road, Withington, M'ter.
6QK	Telephony ..	P. J. Calvert ..	Royston, Eton Avenue, N.W.3.
6QV	---	A. Rich ..	13, New Road, Ponder's End, N.
6RQ	Telephony and C.W.	B. C. Thomas ..	Hilden, Brynceanan Terrace, Llanelly, S. Wales.
6TN	---	E. H. Wright ..	4, Pavilion Buildings, Brighton.
6UT	---	T. A. St. Johnston ..	28, Douglas Road, Chingford, Essex.
6WX	---	A. J. Morgan ..	Elysium, Wraybury, Bucks.



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- Basket Coils (6) 200/3,600 2/6
- Waxless (5), 200/2,000M. 2/6
- Twin Flex, 12 yds. 2/-
- Bell Wire, D.C.C. I.R.C., 10 yds. 10d.
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- 2-way for Igranic Coils. 4/11
- Various Designs do. 5/11, 6/11 & 7/-
- Shaw's Genuine Hertzite 1/3
- Spade Screw Terminals doz. 1/6
- Pin do. doz. 1/3
- Ebonite Dial and Knob. 1/4
- Do., Extra Quality 1/8
- Ebonite Valve Holders 1/3
- Do., Cut from Solid 1/6
- Valve Sockets, Best, doz. 1/3
- Do., Plain doz. 1/-
- Terminals, Telephone doz. 1/6
- Do., Pillar doz. 1/6
- Do., Small Pillar doz. 1/4
- Do., W.O. Patt. doz. 1/6
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- Insulating Sleeve, 3 yds. 1/3
- Tinned Copper, 3 yds. 14 or 16 gauge 9d.
- Do., 3 yds., 18 or 20 gauge 6d.
- Ebonite Coil Plugs, 2 for Do., on Stand 2/-
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- Ormond Filis. Resistance. 2/6
- Fixed Condensers, .001. 1/2
- Do., .001 to .0005 1/2
- Do., .002 to .005, 1/3; .006 1/6
- (Above best quality.)
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- Do., D.C.C. Ball Rotar 6/9
- Ebonite (Inside Winding) Variometers 13/6
- Contact Stops doz. 1/-
- Battery Clips doz. 1/-
- Coil, 26 tps., 1,600 M. 2/6
- 4 Whiskers, 1 Gold 6d.
- Spear Point Whisker 4d.
- 12 yds. Empire Tape 1/-
- Plug and Socket, 12 prs. 1/6
- Gecosite Crystal 1/6
- Minicup Switch 8/-
- Radio Ins. Transformer 25/-
- Igranic Shrouded, L.F. 5-1 21/-
- Formo Shrouded, do. 18/-
- Formo Open Type, do. 12/6
- Royal, do. 20/7
- Tested on Aerial, do. 12/6
- Raymond, do. 12/6
- Ormond Filis. Rheostat. 2/6
- Raymond do. 2/-
- Rheostat and Dial 2/6
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- Ajax with Vernier, 30.5 ohms 5/-
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- Igranic Rheostat 4/6
- Peerless Rheostat, 6 ohms 4/6
- Peerless " 15 ohms 4/9
- Peerless " 30 ohms 5/-

## VARIABLE CONDENSERS.

One Hole Fixing.

### NEW MODEL. "A" TYPE

.073 in. Spacers.  
6d. per set extra.

Cap.	Plates.	Price.
.001	49	7/11.
.00075	37	6/11.
.0005	25	5/11.
.0003	15	5/3.
.0002	11	4/9.
.0001	6	4/3.



.088 in. Spacers.  
6d. per set extra.

Cap.	Plates.	Price.
Approx. .001	57	6/6.
.00075	43	5/9.
.0005	29	5/-.
.0003	19	4/6.
.0002	13	4/-.
.0001	7	3/6.

#### NATIONAL LABORATORY CERTIFICATE

Above new model specially adapted for taking up min. amount of space. As shown with Knob and Dial. Laboratory Test. One hole fixing.

Vernier, 2/6. (No knob or dial.) Above "A" type is a wonderfully cheap and reliable condenser. One hole fixing. Thousands of testimonials from satisfied users.

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All Post Orders from other Columns.

- Telephone, large each 1/d.
- Telephone .. each 1d.
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- Various doz. 1/- & 1/6
- Valve sockets doz. 10 1/2d.
- Contact studs doz. 4d.
- 2, 4, 5, 6 B.A. Nuts 3 doz. 6d.
- 2 B.A. Rod .. foot 3d.
- 4 B.A. Rod .. foot 2 1/2d.
- Valve Pins .. doz. 6d.
- Brass Bushes .. 1d.
- Spade Tags, best quality doz. 3d.
- Screw Spade Terminals. 1d.
- Pin Screw do. .. each 1d.
- Stop Pins .. 2 a 1d.
- Plug and Socket pair 1 1/2d.
- Easyfix Cup .. 1 1/2d.
- Switch Arms 8d., 9d. & 10d.
- Do., with 12 Studs and Nuts 1/-
- English Flash Lamp Batt. doz. 4/3
- H.T. Batteries, 36 v. 5/-
- H.T. Batteries, 60 v. 8/6 & 10/6
- Filament Res., with Dial 2/-
- Set of Names (12) 5d.
- 0-300 Dial 5d.
- Scales (Engraved 0-180) 3d.
- Multiphone Terminals 9d. & 1d.
- Insulators, Egg ... 6 for 6/-
- Aerial Wire, limited, 100 ft. 1/10
- Extra Hard Drawn, 7/22 100 ft. 2/6
- Valve Windows ... 7d.
- Res. Dials, 0-100 4d.
- Ebonite Dial and Knob, 0-100 1/3 & 1/3
- Filament do. and Knob. 9d.
- Filament Dial, 0-10 6d.
- Fixed Condensers to .001 10d.
- Do., .002 to .005 & .006. 1/3
- Ins. Screw Eyes. 1d.
- 4 Cats Whiskers (1 gold) 3d.
- Gold Whisker 1 1/2d.
- Shaw's Hertzite. 1/-
- Zincite, 6d.; Bornite 6d.
- Coil Holders 1 1/2 & 1/3
- Coil Plugs, Ebonite 7d. & 9d.
- Do., on Base 1/- & 1/3
- Best Valve Holders 1/3
- 3 makos, above 10d., 1/- & 1/3
- Tinned Copper, 16, 18, 20g. 1/3
- Sleeving, takes 18g., best, 3 yds. 1/-
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- Rubber Lead-in 10 yds. 1/- & 1/3
- Bell Wire, D.C.C. I.R.C., 10 yds. 5d.
- Twin Flex .. 12 yds. 1/6
- Heavy Rubber Lead-in yd. 2d. & 3d.
- Basket Coils (6) up to 3,500 .. 1/9
- Waxless (5) .. 1/11
- D.P.D.T. Switches for Panel S.P.D.T. do. 1/6
- Telephone Cords 9d.
- Grid-Leak (2 meg.) 1/-
- Do., and Condenser .0003 1/9
- Empire Tape doz. 9d.
- Adhesive do. roll 4d.
- A.A. Earth Clips 7d.
- Washers, 2 and 4 B.A. 3 doz. 2d.
- 100,000 ohms Res. 1/6

- #### HEADPHONES.
- Sterling B.B.C., high class (4,000) 25/-
  - B.T.H., B.B.C. None better (4,000) 25/-
  - Brunel, Very fine value (1,000) 17/6
  - Brunel, for Crystal Sets (8,000) 19/11
  - N. & K., all stamped (4,000) 12/9
  - Sidpe, very best 12/9
  - Post 1/- pair.

- #### H.T. BATTERIES.
- Post 1/- each.
  - 36 v tapped 5/- & 5/6
  - 60 v tapped 9/6 & 10/6
  - Cheaper kinds usually in stock.

#### SUPER CONDENSER WITH SINGLE PLATE VERNIER. "IT" FOR VERY FINE TUNING.

- .001 .. 12/6
- .0005 .. 10/6
- .0003 .. 8/6
- NOT AN ATTACHMENT.
- Post 6d. set extra.



- #### CRYSTAL DETECTORS.
- Post 9d. each.
  - Glass enclosed Whisker, Brass Fittings, 1/9, 2/3 & 1/6
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  - Edison Bell Twin 5/6
  - Choice Designs, 5/- & 7/6

- #### VALVES 12/6
- Marconi R. Ediswan 12/6
  - Mullard O. Cossor P.z. 12/6
  - Post 1/- each.

#### FILOSTAT FOR D.E. and R. VALVES

- Post 6d.
- each 2/6

#### EDISON BELL or IGRANIC VARIOMETER

- Inside winding including Knob and Dial 15/-
- Post Free.

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- Lissen Grid Leak (Var.) 3/9
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  - Lissen T1 Transformer 30/-
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  - Lissen Series Parallel Switch 3/9
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  - 100,000 ohm Resistance 2/6
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  - Do. .002 to .006 2/-
  - Do. .0003 and Grid Leak 2/6
  - Raymond Fixed .001 1/1
  - Do. .0002 to .0005 1/1
  - Do. .002 to .005 1/5
  - Do. .008 1/6
  - Do. .0003 and Leak 1/10
  - Dubilier Fixed .001 3/-
  - Do. .002 to .006 3/-
  - Do. .0001 to .0005 2/6
  - Do. .0003 and Grid Lk 5/-
  - 'Phone Cords, 54 in. 1/3
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  - Do. Ebonite 250/650 3/11
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- #### DULL-EMITTERS.
- All makes in stock.
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- Phillips R. ... 7/11
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  - No post orders.

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- COIL HOLDERS.
  - Plug-in type, Ebonite, Brass fittings on base. Two way ... 3/3
  - Three way ... 4/6
  - Post 1/- each.

## N. & K. (The Goods)

Best. Stamped Genuine 4,000 ohms 12/9 Pair. Post 1/- pair.

#### BASKET COILS

- Set of 6 .. 1/11
- Set of 7 .. 2/3
- Post 6d. set.
- to 3,600 metres.

- #### WAXLESS.
- Set of 5 .. 1/11
  - Set of 6 .. 2/3
  - Post 6d. set.

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RIGHT OPPOSITE DALY'S GALLERY DOOR

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27, LISLE STREET, W.C.2

HOURS OF BUSINESS: DAILY - 9 to 7.45 SUND. 10.30 to 1

'PHONE: GERRARD 4637.



## VARIABLE VERNIER CONDENSERS.

### ONE HOLE FIXING

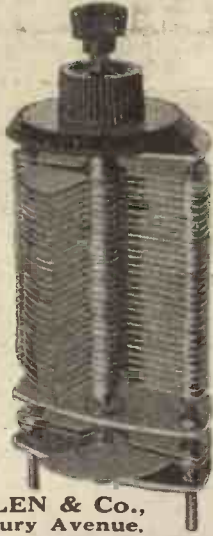
.073 in. Spacers,  
Aluminium End  
Plates, Ebonite  
Bushes, and com-  
plete with genuine  
"Radion" Knobs  
and Dial.

	s.	d.
.0002 ..	9	6
.0003 ..	10	0
.0005 ..	10	6
.001 ..	11	6

Postage & Packing 6d.

Sold on a money  
back guarantee, by  
the manufacturers,

**R. MCKELLEN & Co.,**  
40, Shaftesbury Avenue,  
Piccadilly Circus, LONDON, W.1.



**WIRELESS BOXES, IN MAHOGANY,**  
Polished, brass handled and baize lined,  
in two compartments. Size  $7\frac{1}{2}'' \times 3\frac{1}{2}'' \times 7\frac{1}{4}''$   
deep  $\times \frac{3}{8}''$  timber. Brassfitted throughout.

Price 3/6 each, post free.

**HUBERT JONES,**  
King Street Warehouses, Bury.

### WIRELESS INVENTORS

Patents and Trade Marks. Advice Hand-book  
and Cons. free.—**B. T. KING,** Regd. Patent  
Agent (G.B. & U.S.A.), 146a, Queen Victoria  
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### Radio "CROXITE" Panels.

The only Silk matted finished insulating panel.  
High dielectric strength, clean drilling,  
non-absorbent, non-conductive, ridged  
without being brittle, 1/10d. per lb.,  
subject. Trade only, price and sample,  
Sole Manufacturers,  
**CROXSONIA COMPANY,**  
10, South Street, London, E.C.2.

### TERMINAL TABS

Crystal Sets .. ..	7½ d.
Valve Sets .. ..	1/6
Trade Supplied. Post free.	
Agents wanted.	

**MERTON WIRELESS ENGINEERING CO.,**  
64, Victoria Street, S.W.1.

**ADVERTISEMENTS FOR THESE  
COLUMNS ARE ACCEPTED  
UP TO FIVE P.M. THURSDAYS  
FOR THE FOLLOWING WEEK'S  
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MINIMUM SPACE ACCEPTED  
HALF-INCH AT 12/6. CASH MUST  
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AND BE SENT TO THE SOLE  
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4, LUDGATE CIRCUS,  
LONDON, E.C.4.

**NOTE NEW TELEPHONE NUMBER  
CENTRAL 1080.**

## TECHNICAL NOTES.

(Continued from page 214.)

patent of Dutch origin describes an amplifier consisting of a neon tube, in which greater efficiency is obtained by a special arrangement of the electrodes. The cathode consists of a small rod or plate of magnesium or suchlike "alkaline" metal, and the glow is confined to the surface of this cathode.

Two spirals of iron wire surround this electrode, the first of which is used as the main anode, and is maintained at a potential of about 120 volts positive with respect to the cathode; whilst the second is maintained at a positive potential of about 100 volts, or about 20 volts negative with respect to the main anode. Most of the current flows to the main anode, the subsidiary anode serving as a control electrode, by means of which the tube is made to act as an amplifier.

### Earthing Clip.

A very handy earthing clip, which is now being adopted by the Post Office in connection with ordinary line telephone instruments, has been introduced by the G. E. Co. It consists of two metal plates about  $1\frac{1}{2}$  inches in length, one of which bears against the water-pipe; whilst the second is provided with two screws, by means of which the distance between it and the first plate may be increased.

The two plates are placed, one upon the other, against the water-pipe, and bare copper wire is bound tightly round the pipe and the clip, several turns being laid on. The screws are then advanced, so separating the two plates, and causing the wire to bind very tightly upon the pipe. In this way a very efficient earth is obtained without the disagreeable necessity of soldering on to cold-water pipes.

### Interference from Power Line.

I heard recently of an interesting case of interference from a high-tension overhead power line. The usual thing to do is to run the aerial at right angles to the offending power line; but in this case the power line happened to turn at a right angle in the vicinity of the aerial, so that the latter could not be placed at right angles to both parts of the power line. The interference was eventually overcome by running a twin aerial parallel to one leg of the power line (and at right angles to the other) and earthing the aerial wire nearest to the parallel power line, the other wire being used as aerial. The earthed wire thus acted as a screen against the parallel power line.

### Wireless Weather Prediction.

Professor Rothé, of the Faculty of Sciences at Nancy, France, has made an elaborate study of the use of wireless in weather prediction. He has found that storm clouds give loud clicks in the receivers (which was fairly well known already), but he has carefully tabulated the way in which the character of the sounds depends upon the violence, duration, and distance of the storm.

Experiments of this sort are easily repeated, and by keeping a note of the weather sounds and connecting them with subsequent weather, it is possible soon to become comparatively expert at predicting the weather. The experiments, however, can best be carried out in the summer.

According to Professor Rothé, this application of wireless reception is only in its infancy, and very important developments in it will be made in the near future.

### Wired Wireless.

Owing to the success and considerable adoption of the system of wired wireless in the United States, the question of its employment in this country has again come up for discussion. It is not generally known that in the very early days of the B.B.C. experiments were actually made in the use of wired wireless. The use of this system has been recently urged by many listeners as a remedy for the cross-talk which sometimes occurs when using land-lines in the ordinary way. The B.B.C. state that they have considered the use of wired wireless, but that owing to a variety of complications it would be impracticable to adopt it in this country at present.

### Spare Filaments.

The usual cause for the discarding of a valve is the burning-out of the filament, and the idea of providing a second filament to enable the life of the valve to be prolonged is by no means new, although it has not been adopted to any considerable extent. In patent 207,740, of Phillips, however, it is proposed to provide two filaments, one being connected to the two filament pins of the valve in the usual way, the other being connected at one end to one of the filament pins and at the other end to an additional terminal outside the valve base.

By means of a small clip attached to this terminal, the latter can be connected to the second filament pin, exterior to the valve, when the first filament has burnt out. In this way the second filament is thrown into action, the same filament pins being used as before.

### Electrolytic Rectifiers.

Many types of the electrolytic rectifier suffer from the defects that the liquid overheats in use, rectification is not so efficient at the higher temperatures, and the plates become fouled. According to the claims of M. A. Codd, in Br. Pat. 207,987, these defects are largely overcome by the use of a solution of sodium bicarbonate and sodium phosphate; these may be in equal proportions, or the bicarbonate may be somewhat in excess. About a pound of the mixture is used to a gallon of water. A trace of calcium carbonate may be added and also a trace of gum-arabic.

### Loud Speakers.

It has long been known that the sound emitted from a sound-producing arrangement—for example, the human throat—is affected by the nature of the surrounding gas. If hydrogen is inhaled into the lungs, the voice, whilst the hydrogen is being exhaled, is quite different from the normal voice. It has recently been proposed to apply a similar principle to the improvement of the sound emitted from a loud speaker, the inventor stating that an increased volume is obtainable by causing a slow-speed circulation of air through the trumpet.

This is to be done by inserting an electrical heating element into the throat of the loud speaker and providing apertures to serve as inlets for the air. Whether the improvement is supposed to be due to the circulation or to the heating of the air, or both, is not clear.





We must be amused—we can have too much excitement; but we can never laugh too much. Bad headphones are past a joke. If you have a Fellows Set you know its value. Get Fellows Headphones too, and hear every word clearly.

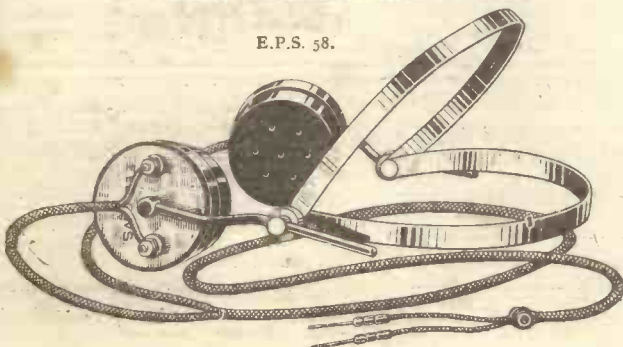
The "Lightweight" Headphones weigh under 6 ozs., and are extremely comfortable. With the special spring adjustment the ear-pieces may be moved into any desired position or separated without the use of adjusting nuts. This fitting is specially designed not to tear the hair. Wound to 4,000 ohms, they are very sensitive and well made, with duralumin headbands, stalloy diaphragms, etc.

: PRICE 18/6 :

FELLOWS MAGNETO Co., Ltd.,  
PARK ROYAL, N.W.10. Phone: Willesden 1560.

**FELLOWS**

E.P.S. 58.



Type 600.

## Constructional Chats

By PHILIP R. COURSEY, B.Sc.

No. 4, continued.

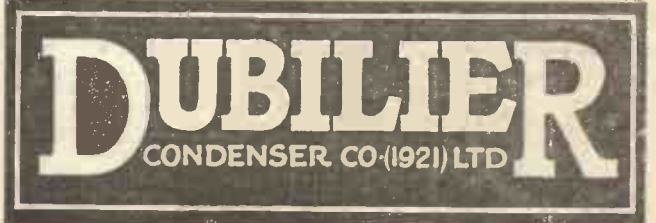
### The "by-pass" Condenser.

Consider now the conditions in the anode circuit of a detector valve. The valve being inherently an amplifier, the radio frequency potentials applied to its grid either from the aerial circuit directly or from the preceding radio frequency amplifier if one is used, will be further amplified in the detector valve, so that a magnified copy of them flows in the anode circuit of the valve. In this circuit, however, we already have a steady direct current flowing as well, so that these amplified radio-frequency currents will be superimposed on the steady direct current.

The effect of the grid condenser and leak, however, is to cause periodic changes in the value of the steady anode current in accordance with the modulation of the incoming signals, so that these variations also are superimposed on the steady direct current, and may be regarded as a superimposed low, or audio frequency current. We have already seen, however, that the condenser offers much less impedance to the passage of high-frequency currents and consequently the amplified radio-frequency currents will be by-passed through the condenser, whereas the audio-frequency components will pass through the telephone or inter-valve transformer primary, whichever is used. A suitable value of condenser for this use is generally in the neighbourhood of 0.001 microfarad.

Note: No. 5 of this series deals with the use of Grid Leaks; have you seen it?

Advt. of The Dubilier Condenser Co. (1921) Ltd. Ducon Works, Goldhawk Rd., London, W.12.



E.P.S. 53.



# LISSENIUM

## Why mix your parts ?

The writer in an article who tells you how to build your receiver specifies various parts because it would appear to confer an undue preference if one maker's parts were used. You can, of course, make your receiver out of mixed parts, but it will never give the same results as a finished instrument built with all LISSENIUM Parts. It is precisely because performance is dependent on good parts that there is a LISSENIUM Part for every vital part of a receiver. The decision is in your hands as to what parts shall go to the making of your finished instrument. **ACCEPT THE RESPONSIBILITY BY DECIDING FOR YOURSELF AND BUILDING WITH YOUR OWN HANDS—use a LISSENIUM Part wherever you can and the finished receiver will give such results as could never be obtained with mixed parts.**

### How to substitute LISSENIUM Parts where others are named:



Where plug-in coils are suggested for aerial or anode tuning, LISSENIUM Lissenagon (Prov. Pat.) coils should be used. The low wave-length coils are specially designed and made so that they deal with the higher frequencies involved in short wave-length work in a way no other coils can.

Where reaction is specified in the anode circuit, it is important to use LISSENIUM Lissenagon (Prov. Pat.) coils, for the absence of damping effect in these coils makes a material difference in anode circuits—**PARTICULARLY IF A CRYSTAL IS USED FOR RECTIFICATION.**

**LISSENIUM TUNING CHART:**  
Note the Intermediate Coils: 30, 40, and 60.

TABLE 1.		TABLE 2.		PRICE	
Wavelength range when used as Primary Coils with Standard P.M.G. Aerial and .001 mid. condenser in parallel.		Wavelength range when used as Secondary Coils with .001 mid. condenser in parallel.			
No. of coil.	Minimum Wavelength	Maximum Wavelength	Minimum Wavelength	Maximum Wavelength	
25	185	350	100	325	4/10
30	235	440	130	425	4/10
35	285	530	160	490	4/10
40	360	675	200	635	4/10
50	480	850	250	800	5/-
60	500	950	295	900	5/4
75	600	1,300	360	1,100	5/4
100	820	1,700	500	1,550	6/9
150	965	2,300	700	2,150	7/7
200	1,885	3,200	925	3,000	8/5
250	2,300	3,800	1,100	3,600	8/9
300	2,500	4,600	1,400	4,300	9/2

**FOR TUNED ANODE RADIO FREQUENCY AMPLIFICATION** the LISSENIUM REACTANCE (Prov. Pat.) should be used for one or two stages H.F. Its advantages over the LISSENIUM H.F. Transformer is that it gives greater amplification of signals. No receiver intended for long distance work should be without one stage LISSENIUM REACTANCE. Switch complete—**LISSENIUM ONE HOLE FIXING, OF COURSE**—diagram with each shows easy connections.

150-10,000 metres ... 19/6  
Self-tuned, but oftentimes a vernier is an advantage if fitted—preferably use the LISSENIUM Vernier.

**AUDIO FREQUENCY AMPLIFICATION**—No transformer can compare with the LISSENIUM T1 for power and purity of tone—use it immediately behind the detector valve. Its valuable coil would amplify without an iron core at all—**USE IT ALWAYS FOR POWER WORK ALSO** ... 30/-  
**IN REFLEX CIRCUITS** THE LISSENIUM T2 has been found to be a fine transformer, where it yields pure and powerful amplification ... 25/-  
**AN EXCELLENT LIGHT TRANSFORMER**—LISSENIUM T3 ... 16/6

**CUTTING OUT HEAVY INTERFERENCE**—The LISSENIUM RECEPTOR (Prov. Pat.) is invaluable in the elimination of nearby Broadcasting stations or Morse interference. Very easy to connect—requires a low loss condenser to tune it separately—preferably use the LISSENIUM Mica Variable Mark 2 Condenser ... 17/6

LISSENIUM RECEPTOR, Mark 1, for broadcasting ... 7/6  
Mark 1, for 600 metres ... 7/6  
Mark 2, for broadcasting and 600 metres combined ... 15/6

The LISSENIUM RECEPTOR ACTS AS A SENTINEL BESIDE YOUR RECEIVER.

**A UNIVERSAL CONDENSER**—Here is a low loss condenser that can be used equally in the aerial and in the anode circuit—it can actually be used as a vernier condenser to tune the LISSENIUM REGENERATIVE REACTANCE—it has such a negligible minimum capacity—tunes through 710 degrees of scale—one part of the scale gives extremely small changes of capacity, while another part of the scale gives more critical changes of capacity. THE LISSENIUM MICA VARIABLE CONDENSER, Mark 2 type (Prov. Pat.) ... 17/6

**THEY DELIVER ALL THEIR STORED UP ENERGY**—LISSENIUM FIXED CONDENSERS—'.0001 to .0009, 2/-; .001 to .002, 2/6; .003 to .006 ... 3/-

**YOU JUST GENTLY PULL OR PUSH**—and you hear these little switches "make" with a reassuring click. The contacts do not shunt when changing over—they are self-cleaning—there are no neater or handier switches. They have many uses. LISSENIUM ONE HOLE FIXING, OF COURSE. Take up hardly any room.

LISSENIUM Two-way Switch (Prov. Pat.) ... 2/9  
" series Parallel Switch (Prov. Pat.) ... 3/9

Alternatively, the LISSENIUM Tuner can be used for aerial tuning and LISSENIUM Lissenagon plug-in-coils for the anode reaction circuit. The LISSENIUM Tuner covers 150 to 4,000 metres, and avoids the need for changing coils. It has a switch complete, so that there are no taps to solder—gives sharp tuning on all ranges—turns not in use are short circuited in a way that obviates "dead-end" loss. Needs a .0005 condenser to tune it—(preferably the LISSENIUM Mica Variable Mark 2 Condenser, 17/6) **22/6**



Instead of plug-in coils in the anode circuit, the LISSENIUM REGENERATIVE REACTANCE (Prov. Pat.) can be used. The advantage is that it covers 150 to 4,000 metres with fully variable reaction over the whole band. Other stages of radio frequency, amplification can be added as desired, whereas with plug-in coils one stage of H.F. is about all that can be managed. This LISSENIUM Part makes a receiver exceedingly sensitive. It replaces aerial reaction and **IT DOES NOT RE-RADIATE**. Switch complete—**LISSENIUM ONE-HOLE FIXING, OF COURSE**. No drilling. Price £2 12s. 6d. (lower in cost than a set of plug-in coils, and no coil holder to buy). Tune always with a Vernier—preferably the LISSENIUM Vernier, which is specially designed for fine tuning in H.F. circuits. Price 12s. 6d., barely 1 in. diameter.

LISSENIUM control will make a wonderful difference in a receiver. It gives accurate control of critical electron emission—it puts a **FINE EDGE ON DETECTION**—particularly useful on long distance work. There are three types of LISSENIUM to choose from—each is suitable for dull emitter and ALL VALVES. LISSENIUM (Prov. Pat.)—super filament control ... 7/6  
LISSENIUM MINOR (Prov. Pat.)—a perfect little control ... 3/6  
LISSENIUM UNIVERSAL (Prov. Pat.)—protects dull emitter valves ... 10/6  
To those who make the mistake of thinking that LISSENIUM Control is the same thing as an ordinary rheostat—**LET THEM TRY THE DIFFERENCE.**



Where a transformer coupling for H.F. valves is desired, the LISSENIUM H.F. TRANSFORMER should be used. The advantage this has over the LISSENIUM REACTANCE is that as many stages of H.F. as desired can be employed with great stability of control. But it does not give the same degree of amplification as the LISSENIUM REACTANCE. Recommended when more than two stages of H.F. are used or in circuits where a transformer coupling of H.F. valves is essential. 150-1,000 metres, 19/6. Switch complete—**LISSENIUM ONE-HOLE FIXING, OF COURSE**—diagram with each.

**CORRECT GRID POTENTIAL**—this is the greatest use for the LISSENIUM Variable Grid Leak—with some circuits and valves variable grid control is not so important as with others, but it is always an excellent thing to be able to alter grid potential to suit each varying phase of the valve and circuit. An interesting alternative is across the secondary of a transformer or across the loud speaker itself where it suppresses any tendency to amplify the higher notes of the musical scale disproportionately to the lower. LISSENIUM ONE-HOLE FIXING, OF COURSE—**POSITIVE STOPS BOTH WAYS** ... 2/6

A stabilising resistance—the LISSENIUM Variable Anode Resistance has the same outward appearance as the LISSENIUM Variable Grid Leak—continuously variable 20,000 to 250,000 ohms ... 2/6

**HERE ARE PREDOMINANT PARTS THAT WILL MAKE YOUR RECEIVER THE MOST ENJOYABLE THING IMAGINABLE.**

We guarantee every Lissen Part to satisfy you perfectly—We EXPECT to hear from you if you are not satisfied.

## LISSENIUM LIMITED

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