FEATURES IN THIS ISSUE.

The Radio Typewriter.  
Minor Valve-Set Repairs.  
Cardiff Station Notes.  
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The B.B.C.'s £200 Holiday Competition.

New Form of Crystal Detector.  
An Efficient One-Valve Receiver.  
The New Manchester Station.  
Single Panel Unit Valve Set.
SPEAKS FOR ITSELF

AMPLION RECEIVERS are designed and produced by the world’s original and largest manufacturers of Loud-speaking Telephones. First demonstrated in 1887, commercially introduced in 1893, adopted by the British Admiralty in 1894, and by Foreign Governments and the leading Steamship Lines in the following years, no less than 12,000 vessels were fitted with Graham’s instruments by the end of the year 1919, besides installations in numerous power stations and for other purposes. To-day the number of Graham Loud-speakers in use exceeds that of all other makes combined.

More Loud-speakers than ever are now produced in the Graham Factories or under licence, and in the Wireless field the Graham Amplion represents the utmost technical efficiency and unequalled commercial value.

Ask for Folder "P.W."

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THE ALGRAPHONE SALON,
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*Phone: Regent 1075.

ALFRED GRAHAM & CO.,
*Phone: Sydenham 2820-1-2.
*Grams: “Navalhada, Catgreek, London.”

SCOTLAND—Mr. F. M. Milligan, 25, Renfrew Street, Glasgow.
IRELAND—Mr. Alex. K. Murray, 41, Chatsheen Street, Belfast.
CAYADA—Messrs. Buss cope of Canada Ltd., 173, King Street West, Toronto.
A Few Notes from 5 IT.

Mr. Joseph Lewis, a well-known Midland conductor, has been appointed musical director, and a station choir and a repertory of solos have been formed. These will be responsible for all the vocal music of 5 IT, and besides songs, duets, etc., selections from operas and oratorios will be leading features.

On Friday, August 17th, an augmented orchestra will give an Elgar programme, and Saturday will see the first appearance of Appleby Matthews’ military band.

On Wednesday, August 15th, there was a land-line transmission of the orchestra of the Locello’s picture-house, this is an innovation which is increasing in popularity each week.

Thunder and Cold Salmon.

There is to be hoped that a more select repertory will be given in the children’s hour from 2 LO in the future. On Thursday, August 22nd, in particular, it was rather distressing to hear pessimistic references to the approach of thunderstorms, and not particularly amusing to hear that one of the announcers had eaten too much cold salmon.

A little knowledge of child psychology would show that thunderstorms are not the most suitable subjects for children just going to bed. As for the salmon, some people never know when they have had enough!

A Farewell Ceremony.

On Friday, July 27th, a particularly happy little affair took place in Manchester, when the members of the staff and orchestra of 2 ZY gave a luncheon to their departing director, and presented him with a handsome gold watch. This, I believe, is the first social function in the history of the British Broadcasting Company, and therefore deserves special mention. Mr. Burrows, the director of programmes to the company, and Mr. Godfrey, who will succeed Mr. Wright at the Manchester station, were both present at this function. Accepting their tribute of good wishes and esteem with obvious emotion, Mr. Wright replied, nevertheless, with characteristic whimsicality: “I hope that it keeps better time than the studio clock.”

Mr. Wright takes with him to London the sincere good wishes of all listeners in the station area. The ideal feeling existing between Mr. Wright and all who come in contact with him is admirably set out in the inscription engraved on the back of his watch:

“To Kenneth Anthony Wright
(Uncle Humpty-Dumpty),
From the Staff and Orchestra of 2 ZY.
An appreciation of a man.”

The New Broom.

Mr. Wright is succeeded by the eldest son of a man whose name is associated with British music all over the world—Sir Dan Godfrey—whose name he bears. Mr. Dan Godfrey is already a very distinguished musician. He will

be assisted by Sidney G. Honey, who is well-known for his charitable work among young men, and who has recently been acting as announcer at 2 LO.

Lady Baden-Powell.

Many people enjoyed listening-in to Lady Baden-Powell talking to her Guides last week. Lady Baden-Powell told me she felt quite happy before the microphone, and was quite pleased to speak to her Guides in this way.

Future Events from 2 LO.


August 20th.—Dr. V. E. Pallin on “The Wonders of X-rays.”

August 21st.—An appeal on behalf of the Royal Infant Orphanage; Major G. C. Home on “Roman Britain.”

A receiving station almost entirely home constructed by Mr. A. T. Billingsley, 102, Manor Rd., Leyton, E.10.

A Cardiff Station Item.

A SPECIAL Mozart programme will be given on Sunday, the 19th inst. when Miss Doris Lemon (soprano) and Mr. William Michael (bass) will perform.

The New Southern Station.

The B.B.C. have acquired the whole second floor above Messrs. Vernals’ tram depot, 68, Holdenhurst Road, for theournemouth station. The studio being about 33 ft. by 20 ft., it will be the largest provincial studio, and will not be so heavily draped as is the studio at 2 LO. The transmitting site is situated in Bushey Road, backing on the North Cemetery. This station will be the only one on the B.B.C.’s own land, and consequently they will have considerable opportunities of experimenting and improving transmissions. The Marconi wireless installation of 1,500 watts will be used, and broadcasting will begin about the middle of September.

French Wireless Club.

Though France took up broadcasting some time after this country, wireless societies are being formed all over the country. It is interesting to note that the English phrase Radio Club has been borrowed in its entirety, and is now incorporated in the wireless—of France. A new club has recently been formed at Anvers, called the Radio Club d’Anvers, and has met with a great welcome in that district.

After Three Months.

The time of writing the Broadcasting Committee are still “considering,” and there appears to be no sign of their cogitations ever coming to an end. Mean-
NOTES AND NEWS.
(Continued from page 909.)

while, the wireless slump is becoming more acute, and the general public are fast losing interest in broadcasting.

* * *

And So It Goes On.

THE report that was to have been issued last week has been postponed indefinitely, and we are still in the dark. Why the committee cannot tackle one thing at a time it is difficult to understand. The most important consideration is the licence problem, and until that is settled broadcasting can never be firmly established. If this is too much for the committee they should say so, and leave it to a more competent body.

A Wireless Obstruction.

A CHEMIST agent for wireless sets was summoned for causing an obstruction. It was said that a crowd of more than three hundred people assembled outside his shop whilst wireless demonstrations were given inside. It was argued that his licence entitled him to give concerts, which were advertised for him.

The Bench dismissed the case on payment of costs, as it was the first summons of its kind.

* * *

Tracking Criminals by Wireless.

SCOTLAND YARD is to have two new transmitters of 500 watts power each. Major T. H. Vitty, engineer, and Mr. G. A. H. Wootton, wireless expert of Scotland Yard, were chiefly concerned in the recent experiments which led to the purchase of the new sets.

* * *

Journeys Saved.

THE adoption of wireless by the police force will assist in cases of intricate and baffling natures, which necessitate inquiries in several directions. Many local constabularies are watching with interest this innovation at Scotland Yard.

* * *

5 W A's New Control Room.

THE Cardiff Station has been fitted with a new control room, and there is no doubt that this innovation will greatly add to the efficiency of 5 WA. The control will naturally be easier, and it will enable the station to broadcast weather reports received from Fishguard during the afternoon.

* * *

Damage by Lightning.

A READER writes that his set was damaged in the recent thunderstorm, although his aerial and earth wires were connected together. The lightning flash struck the ventilator in the glass roof, and smashing a gas bracket, set light to the gas which in turn lighted the wooden rafters in the glass roof, and jumped a gap of one foot, six inches. The lead-in tube was bent to a curve, and the curtains and wooden curtain rings set on fire. It also blew a three-inch hole in the glass of the window, just under the lead-in tube.

* * *

A Special Wireless Telephone.

A DEMONSTRATION of the use of wireless telephony on aircraft was given to Sir Samuel Hoare, Secretary of State for Air, and Lady Hoare, when they recently flew to Gothenburg, Sweden. The aeroplane in which they travelled was fitted with a Marconi A.D.2 Wireless Telephone Set, and extra 'phones were provided to enable Sir Samuel and Lady Hoare to listen to the conversation with the wireless stations during the voyage.

* * *

Further Extortions.

I HAVE received a letter from one of our readers stating that the L.C.C. charge £1 deposit to erect an aerial on their land, and a further sum of £1 ls. if their own workmen erect it, in the Rotherhithe district. I suppose the L.C.C. require payment to think these things out.

* * *

A £1 is Prize.

READERS in Bournemouth should look out for a 4-seater car, possibly an "Albert," with a representative of Popular Wireless and others who are visiting this town on Saturday, August 18th, to test a 6-valve Marconi portable set. A prize of £1 ls. is offered to the first reader who presents a copy of this number to one of the occupants. They will be in the town for the morning transmission, and again for the 3.30 women's talk.

How You Can Tell.

IF you see the ear drawn up on the front with someone listening in, just walk up and hand in your copy of Popular Wireless with your name and address. The first reader to do so will win the £1 ls.

Saved by Wireless.

A LADY travelling on the Carmania was taken seriously ill, rendering an immediate operation necessary. The ship's doctor made arrangements by wireless for an ambulance to be waiting at Queenstown to convey her to Cork.

The Wireless Craze.

WIRELESS is responsible for a new trouble that has arisen in an electrical engineering works as a consequence of broadcasting developments. The apprentices have developed a habit of making wireless parts in their spare time with their employer's material.

The Glasgow Station.

"ROYAL ROY," by Sir Walter Scott, is to be broadcast from the Glasgow station. This is the first time in the history of broadcasting that this famous author's work has been transmitted by wireless.

* * *

Glasgow's Future Items.

MONDAY, AUGUST 20th. Dance night. Mr. Chas. Wreford, Entertainer.
TUESDAY, AUGUST 21st. Mr. Eric Niven, Elocutionist, and Amy Murdoch.
WEDNESDAY, AUGUST 22nd. Classical Night of the Wireless Orchestra, Miss Annie Hobson, Contralto, and Mr. Chas. Brown, Tenor.
THURSDAY, AUGUST 23rd. Miss Doris Lems, Soprano and Mr. Wm. Michael, Bass.
FRIDAY, AUGUST 24th.—By kind permission of Brevet Col. O. H. Delano- Osborne, C.M.G., Royal Scots Fusiliers, now stationed in Glasgow, will render the musical items during this evening's performance.
SATURDAY, AUGUST 25th.—Mr. George Hutchinson, Humorous reader, with his delightful stories of "Mrs. Duff's Experiences in Glasgow," is guaranteed to make you laugh and weep. Miss Jessie Crombie, Soprano. ARIEL.

BROADCASTING TRANSMISSIONS.

Regular transmissions of news and concerts take place daily from the following stations.

Full details appear in the daily press.

London .......... 2L0 .......... 360 metres.
Liverpool .......... 2LT .......... 420 w.
Manchester .......... 2ZY .......... 385 w.
Newcastle .......... 5NO .......... 400 w.
Glasgow .......... 5SC .......... 350 w.
Cardiff .......... 5WA .......... 385 w.

Other stations of interest to listeners in Great Britain are:

Eiffel Tower .......... FL .......... 2,990 metres. Throughout the day.
Radio-Electricite, Paris .......... SFR .......... 1,780. 5.30 to 6 p.m.
School of Posts and Telegraphs .......... 450. 8.45 to 10 p.m.
The Hague .......... PCCG .......... 1,920. 7.45 to 10 p.m. (Tuesdays and Thursdays, 4.20 to 7.45 p.m. Saturdays.)

Note.—A revised and more comprehensive list of the Continental Broadcasting stations is in the course of preparation and will appear shortly.
HOW TO BUILD A CRYSTAL SET FROM MECCANO PARTS.

By ELLISON HAWKS.

THE constructional toy Meccano is now so well known as to be in almost every home. Those who possess Meccano outfits, or whose younger brothers are Meccano enthusiasts, can make an efficient crystal receiving-set from the standard Meccano parts without difficulty. One or two extra parts such as inductance discs, telephone ear-pieces, and crystal, may be obtained separately from the Meccano Company.

Meccano strips and plates are now made from specially prepared fibre, which gives perfect insulation. Some of the parts may also be obtained in brass, and are useful in this form because of their non-magnetic properties. A variety of these plates and strips are perforated with well-known equi-distant holes, at distances of half an inch, and are very useful for constructing home-made apparatus. These fibre strips, together with other standard Meccano parts, are especially adaptable to trying out any new ideas, for standardisation of the parts enables alterations in design or circuit to be made very rapidly.

An Inexpensive Condenser.

Those of our readers who do not wish to make up the complete crystal receiver-set will no doubt be interested in having brought to their notice particulars for making a very efficient variable condenser at the cost of a few shillings. This condenser will be found to function equally as well as a condenser costing five or six times as much.

It is made by connecting together eight 2-in. Meccano triangular plates at the lower end by a 2-in. threaded rod (14, Fig. 2), and at the same time spacing them by two nickel washers between each plate, afterwards clamping them at each end by a washer and nut. At the upper end a 2-in. threaded rod (14a) is used.

Before threading the rod through the plates, two triangular fibre plates (one of the Meccano Company's special radio parts) should be placed between each pair. In order to make the upper spacing uniform with the lower, these are spaced apart by nickel and brass washers, and are clamped together in the same manner as the lower end.

It will be noticed that in these triangular fibre plates one of the corner holes is cut out; this is intended to clear the washers on the rod (14) in order to make a better electrical contact.

Assembling the Fixed Portion.

The fixed portion of the condenser (Fig. 2) may now be fastened in position between 2½-in. and 1½-in. angle strips (5 and 5a). A 2½-in. strip (17) is bolted at the top with a spacing washer at each end, and extra nuts (15) are threaded to both ends of the rods (14 and 14a) to centralise them. The strips 5 and 5a are then secured to the plate at 6 and 6a by two No. 6 B.A. bolts, with an insulating fibre brush between each angle strip and the plate.

The movable portion (Fig. 2) is composed of seven triangular plates threaded in a similar manner to those in the fixed portion, with two nickel spacing washers at the top and bottom, but without triangular fibre plates. This movable portion is passed between the apertures of the fixed portion and connected to the 1-in. and ½-in. brackets (7 and 7a) with a lock-nut on the outside of the same brackets. The special fibre plate (30), itself held in place by two tummions (31) one on each side of the plate. The inductance discs (38 and 39) are connected at the upper corresponding corner of the same plate by hinges.

Tuning is effected by moving the discs towards or from each other, and the hinges are so arranged as to enable them to be brought together as closely as possible. Two terminals (33 and 34) are connected in the two top holes of the outer corner of the plate (30), and a further lower down.

An underneath view of the set is shown in Fig. 4, and the wiring diagram (Fig. 5) will make the connections clear. The circuit may, of course, be varied by placing the condenser in the primary circuit.

(Continued on page 912.)
HOW TO BUILD A CRYSTAL SET FROM MECCANO PARTS.
(Continued from page 911.)

The primary inductance disc, as supplied by the Meccano Company, is wound with approximately 47 ft. of No. 23 S.W.G. D.C.C. wire, and the secondary disc with 50 ft. No. 26 S.W.G. D.C.C. wire. This gives an approximate range of wave-lengths of about 300-500 metres. Broadcast from Manchester has been clearly and loudly received on this set at distances of up to 26 miles.

The wave-length may, of course, be increased by adding holes in the fibre plate. Eiffel Tower have been satisfactorily received. With four such discs, time signals from the Crystal, telephone receiver, and mounting board.

Fig. 5.

Fuller details of prizes will be announced shortly. The judges will be well-known men who will come and announce their decisions and give criticisms of the results personally from the London station, but their reports, as delivered at London, will be read out from other stations also.

The B.B.C. is prepared to receive entries from the 1st August, and the closing date will be the 30th of September, and the company hope to announce and publish the results early in October.

There will be no entrance fee. The following are the preliminary rules for the competition.

Rules for the Holiday Competition.
1. For the most artistic photograph showing the enjoyment of listeners-in.
2. For the most amusing photograph of listening-in.
3. For the most original photograph of listening-in.
4. For the most interesting, original, or amusing sketch of listening-in.
5. For the most interesting, original, or amusing description of listening-in.

Whether you may be at the sea, up the river, in the garden at home, send pictures of yourselves listening-in during some part of the day.

The Editor of "Popular Wireless" welcomes photographs of amateur sets from readers, or anything else of particular wireless interest. 10s. 6d. will be paid for each photograph used.
THE wave-length to which the aerial circuit of a receiving set will tune depends upon the inductance and capacity of the aerial, the inductance of the tuning coil, and the capacity of the tuning condenser. The second is the most important of these factors, and so we will consider first how to ascertain the inductance of a single-layer tuning coil.

It is beyond the scope of this article to give a full explanation of the meaning of inductance and its effect upon wave-length, but it may be stated briefly that the inductance of a coil is a measure of the product of the number of turns of wire, and the magnetic flux produced by a given current flowing in the coil. The flux produced by a coil depends, in turn, upon the diameter and length of the coil, and upon the number of turns with which it is wound, as well as upon the distribution of the flux outside of the coil.

**Formula for Inductance.**

The simplest formula for calculating the inductance of a single-layer cylindrical coil is as follows:

\[ L = \frac{1}{\pi \times k} \times \frac{d \times d}{1} \]

where \( L \) stands for the inductance of the coil in mH, \( d \) and 1 the diameter and length of the coil in cm, and \( k \) is a number which depends upon the value of the expression \( \frac{d}{l} \), the following being a range of values sufficient for most purposes:

<table>
<thead>
<tr>
<th>( \frac{d}{l} )</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0.92</td>
</tr>
<tr>
<td>0.4</td>
<td>0.85</td>
</tr>
<tr>
<td>0.6</td>
<td>0.79</td>
</tr>
<tr>
<td>0.8</td>
<td>0.74</td>
</tr>
<tr>
<td>1.0</td>
<td>0.69</td>
</tr>
</tbody>
</table>

As an example, we will calculate the inductance of a coil consisting of 150 turns of No. 22 S.W.G. enamelled wire, wound upon a former 4 ins. in diameter.

By reference to a wire table, we find that about 1333 turns of wire occupy 1 cm. length of winding; 150 turns will therefore occupy \( \frac{1333 \times 150}{1333} = 11.5 \) cms. Hence the length of our coil is 11.5 cms, and the diameter is 4 ins. = 10.16 cms. This gives for \( \frac{d}{l} \) the value 0.91, for which we find the value of \( k \) to be 0.71. We can now apply the formula given above, and say that

\[ L = \frac{0.00986 \times 10.16 \times 10.16 \times 150 \times 150}{11.5} = 0.71 = 1410 \text{ mHs.} \]

Before we can calculate the wave-length to which a particular coil will tune, we must know the inductance and capacity of our aerial. There are no very simple formulae for this purpose, but for single or parallel-wire aerials which comply with the P.M.G.'s regulations, the values of the inductance are not very much, and in general these may be taken as 0.002 mfd and 15 mHs., respectively.

The capacity of the aerial tuning condenser also affects the wave-length of a receiving set, but we shall not consider this in our calculations, for the A.T.C. should find difficulty in obtaining the square root of a decimal quantity, such as 0.285, should move the decimal point two places to the right, and then proceed by a process of trial and error. Having obtained the correct value, the decimal point must be moved back one place to the left.

**Construction of Coils.**

For instance, to find the square root of 0.285, moving the decimal point to the right gives us 28.5. We can see at a glance that the square root of this lies between 5 and 6, and a few trials will give us the value 5.3. Moving the decimal point back one place gives us 0.53. Had the original number been 0.028, moving the point to the right would give 0.28, of which the square root is evidently somewhere between 0.9 and 2, finally giving 0.17.

We will now imagine that we possess a quantity of No. 20 S.W.G. enamelled wire, and a cardboard tube 2½ ins. in diameter, and we desire to construct a coil which, in conjunction with a P.M.G. aerial, will tune up to a wave-length of 600 m.

First of all we must calculate the required inductance of the coil, and for this purpose we can rewrite our wave-length formula thus:

\[ L = \frac{(\text{wave-length})^2}{1885 \times C} \]

Assuming an aerial capacity of 0.002 mfd, we then have

\[ L = \frac{600}{1885} = 0.3182 = 0.002 = 0.006 = 505 \text{ mHs.} \]

The aerial inductance is about 15 mHs., so that the inductance of the coil must be 490 mHs. Rearranging the formula for the inductance of a coil, the number of turns is given by the following expression:

\[ n = \sqrt{\frac{L + 1}{0.00986 \times k \times d^2}} \]

Here a difficulty arises, for we do not know the value of \( k \) or \( n \) until we have decided upon the length of our winding, which, in its turn, is dependent upon the value of \( k \). Consequently a certain amount of guess work is necessary. As the coil is of small diameter and wound with thick wire, the ratio \( \frac{d}{l} \) will be fairly small, and we might assume, for a start, that \( \frac{d}{l} = 0.7 \), i.e., that the diameter of the coil is not quite three-quarters of the length. The corresponding value of \( k \) in this case is 0.76.

(Continued on page 914.)
DIFFICULTIES OF EXPERIMENTAL VALVE MAKING.

By H. P. WARAN, M.A. Ph.D. (Cantab), F.Inst.P.

A further article by Mr. Waran, in which he describes minutely the construction of an amateur valve, will appear in a future issue of "P.W."

The valve is probably the only component of one's wireless set which still defies all the attempts of even the most enthusiastic of experimenters anxious to improve it in some cheap and simple form. This difficulty arises from the fact that the valve is a very specialised product requiring not only a good scientific knowledge of the processes involved in its manufacture, but a high degree of skill in such unusual arts as glass blowing as well if one is to have any measure of success in making thermionic valves.

The whole difficulty arises from the principal fact that a thermionic valve is a high vacuum device, and even for the so-called soft valve the vacuum in the valve chamber has to be quite a good one. The gas pressure has to be less than about 0.01 m.m. of mercury, all the attempts of even the commonly described as an X-ray vacuum. Such a good vacuum is essential for the following two reasons. Firstly, any appreciable quantity of air left in the valve will immediately burn out the very thin tungsten filament as soon as the valve is lighted up for the first time. Secondly, any excess of residual air will seriously interfere with the function of the valve by setting up space charge effects and other undesirable complications.

Preliminary Difficulties.

This necessity to keep a high vacuum in the valve precludes the efficient use of such materials as corks, rubber, wax, and other stuff of a similar nature in the construction of experimental valves. These materials are not stable compounds like glass, and thus they undergo rapid decomposition when exposed to a high vacuum or high temperature, and the large quantities of gases and vapours liberated by them would foul the vacuum of the valve and render it useless for our purposes.

This necessity for the permanency of the high vacuum in the valve necessitates the use of only such stable materials as glass and metal in the construction of the valve. The valve must have an air-tight outer envelope of one of these materials, and there lies the difficulty for the experimenter. Since the metal (being a conductor) would short circuit the leads if used for the outer envelope the only solution is to use glass (fortunately a very good insulator) for the outer envelope and metal for the inner components. From this glass envelope the four current leads have to be taken out through air-tight seals, and to do that without using were components is rather difficult for the average experimenter. But there is still another difficulty.

Occluded Gases.

Even such apparently stable materials as glass and metal have the very undesirable property of holding large volumes of gases occluded or dissolved in them, and if these are not to foul the vacuum gradually they must be got rid of during the operation of exhausting the valve. To liberate these gases the glass envelope and the metal electrodes in it have to be heated as high as possible during the exhaust. The absolute necessity for this treatment makes it impossible to use any materials like waxes and cements in any part of the valve having access to the high vacuum inside.

Thus the only practical design for an experimental valve is that embodying an all-glass envelope without wax or rubber joints that can be safely heated up during the exhaust to about 300 degrees C. This would mean that the experimenter ambitious to make valves must understand glass blowing, and those anxious to make their own valves would do well to start studying this very useful and fascinating art.

Obtaining the Vacuum.

The problem of exhaust even for soft valves is by no means easy. Ordinary single stage oil pumps are useless for the purpose. Some form of mercury pump is absolutely essential, and with patience and using a Sprengel or Tipler pump one can reach their limit of exhaustion which is about that required for a soft valve. For a hard valve the vacuum has to be much higher, and it can be reached only with the aid of a mercury vapour pump. Every trace of the gas occluded in the glass and metal must be got rid of by heating the valve exposed to the high vacuum. During use the plate of the valve would be subjected to a bombardment of electrons from the filament attracted to it by its positive potential. This would result in the heating of the plate which may liberate any gases left in it. Hence, hard valves are given this bombardment before they are sealed off.

Between the lighted filament and plate a high potential of the order of 1,000 volts or more is applied and the plate becomes red hot and liberates any gases contained in it, and these are immediately removed by the pump. When no more gas is coming from such sources the valve may be sealed off from the pump, and on cooling the valve would have improved in vacuum by the hot metal and glass absorbing any traces of gas still left in the valve.

Notwithstanding these difficulties in the making of a good valve that will work, experimenters will probably spend much time in trying simple arrangements with tubes, corks, and wax. In such attempts they would do well to use a thick platinum wire for a filament in preference to tungsten. Then they would be able to bring their valves up to, at least, the lightening stage without getting burnt out. This would make valves suitable for the use of the amateur who is too timid to suit his paper to the use of the expert.
STRIKING SENSITIVITY
ACCURATE SELECTIVITY!

A Manchester user of the LISSEN REGENERATIVE-REACTANCE writes
that he is able to cut out his local station and select other B.R.C. stations
on two stages, and cut out any station he does not need, a result
which many of his friends are unable to obtain with 3, 4, and even 5 valve sets.

Another Glasgow user writes that he is able to cut out his local
station from two miles away and select Birmingham, which is
separated in wave-length by only 3 metres! He uses 1.L.F.,
1 Oct., 1 L.F.

The LISSEN REGENERATIVE-REACTANCE is critical to
tune—but, of course, you understand you cannot have broad
selectivity and extreme accuracy at the same time.
You will soon get the "feel" of the LISSEN REGENERATIVE-
CONDENSER, and you will be able to tune the best
at once, without any lengthy searching. No switch to connect.

A Manchester user of the LISSEN REGENERATIVE-REACTANCE writes
that he is able to cut out his local station and select other B.R.C. stations
on two stages, and cut out any station he does not need, a result
which many of his friends are unable to obtain with 3, 4, and even 5 valve sets.

HOW AN ORDINARY VARIABLE CONDENSER
AFFECTS SIGNAL STRENGTH.

If the condenser you use has a high resistance it damps signal strength.
Most variable condensers have much too high a resistance—this may
arise from indifference, bad construction, or from the choice of unsuitable materials. The LISSEN MICA VARIABLE
CONDENSER has noube or fibre construction—it is of metal—and its high dielectric strength is obtained by the use
of the best Ruby Mica it is possible to procure. Add to this the LISSEN
the instrument construction and you have a condenser with almost
no negligible resistance. Signals remain strong, therefore.

150-4000 metres—UNBROKEN REGENERATION POSSIBLE OVER THE WHOLE RANGE 
... 12 6 .

Always tune with a Verrier condenser (preferably the LISSEN VERNIER, 1 in. diameter, designed for fine tuning in H.F.,
circuits, price 12 6 .) This LISSEN REACTANCE gives high
efficiency for one or two stages radio frequency
Amplifies and faint signals, adds range and power. Can be used alone or with the LISSEN REGENERATIVE-REACTANCE.
Selected, but when reception of any station is
and is used tune with a Verrier for best results
(preferably the LISSEN VERNIER). Easy
tuning, no lengthy searching. No switch to connect etc.

150-600 metres 
... 27 6
150-10,000 metres 
... 32 6

TUNE HIGH, TUNE LOW,
TUNE SHARPLY—with the LISSEN TUNER.

You have never seen an inductance exactly like it—LISSEN multi-wound, it
contains greater inductance per length of wire with lowest H.F. re-
sistance and least distributed capacity
—the explanation of its sharp tuning properties—with a "noos" condenser (preferably use the LISSEN MICA
VARIABLE CONDENSER 17 6 ) the LISSEN TUNER covers a wave-length
band of 150-4000 metres. Yet it goes compactly into any set, length a 6 in.,
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A CHAT
ABOUT THE "P.W." COMBINATION SET.
By THE TECHNICAL EDITOR.

Describing the results of a series of tests carried out on the original model, and detailing a few points that should receive attention in order that the 100% mark of adaptability, usefulness and efficiency of this unique receiver may be obtained.

TO the wireless man a good circuit gives as much pleasure as does a good horse to the huntsman, a good car to the motorist, or a well-tuned, speedy aeroplane to the aviator, and I can honestly say that the series of tests that I have conducted with the "P.W." Combination Set has been work of pure delight. At no point has there been trouble, and in every respect success has attended us all the way, from the first rough diagram on paper to the finishing off of the complete set. The reason for this is obvious to the more advanced amateur, to whom will be apparent the fact that the keynote of P.W. has been "efficiency, adaptability, and simplicity." The very nature of the circuits involved has rendered it unnecessary to deviate from the path of the straightforward into the complicated and tortuous path of biasing batteries, high-resistance stabilisers, etc., and, apart from the fact that the component values called for rather close attention, no trouble of an obscure nature was encountered.

It must be thoroughly understood, however, that results will suffer and " howling " can arise if the instructions regarding the construction of the set are not faithfully carried out. No guarantee of the efficient operation of the set can be given if amateurs modify the " lay out " or the values of the condensers employed, either fixed or variable. Also the indiscriminate use of twisted flexible wires may cause capacity effects to arise. It is advisable to employ the shortest lengths possible of straight twin wires of the nature of telephone cords for the plugs.

Tuning-in.

In respect of the interior wiring of the units, the usual rules regarding good separation and avoidance of parallel wiring are, of course, essential. Should Unit Two not cause efficient note magnification, change over the transformer primary leads. As the L.T. + is directly connected to the H.T. — in both units, obviously only three battery connections between the two are necessary, but great care should be taken in seeing that the L.T. + and nor L.T. — is taken to the H.T. — in either case, before connecting up.

With those few general remarks concerning the construction of the units, I will now proceed to deal with the handling of the set, and briefly detail some of the results obtained on the original model.

In the first place it will be found that the tuning on the H.F. condenser is not critical, but that the adjustment of the A.T.C. requires to be very close indeed. This is an interesting and useful point. In the case of near-at-hand stations, however, tuning can at first be done on the crystal, which cuts down the variable factors or components requiring adjustment to two — the crystal detector and the A.T.C. This is one of the great advantages of the "P.W." Combination Set, and permits far finer tuning and the finding of a more sensitive point on the detector than is possible with any other type of reflex circuit. The change-over switches are open at "Crystal." The condtor plug in the "C." and H.F. jack for this preliminary tuning. Having tuned in the A.T.C. and adjusted the crystal, the change-over switches are carried over and the valve turned on. The H.F. condenser can now be tuned, and the telephone plug thrust into "Dual" if loud-speaker signals are desired. Where good signals are received on the crystal alone, loud-speaker work should be possible when working "Dual." Referring to loudspeakers, it will be found very convenient if the telephone plug is taken to a small terminal board; this will enable any number of phones or loud speakers to be very quickly brought into circuit.

When working to distant signals it will be necessary to commence tuning with the valve in use as an H.F. amplifier, or it may be even necessary to start right away on "Dual." In these cases it should be remembered that the A.T.C. requires finer tuning than the H.F. condenser, and so, leaving the latter in approximately the correct position, close attention should be paid to the adjustment of the A.T.C. until audible signals are obtained. The crystal detector can always be adjusted to the signal of some near-at-hand station.

Some Surprising Results.

There are, with the two units, as everybody will by now know, six circuits available. Of these latter were comfortably obtainable with Unit Two plugged in. At Leyton, five miles from 2 L.O. in an easterly direction, the London station comfortably worked a loud speaker on the one unit. All the well-known amateurs were easily audible on 'phones, 2 O.M. at Brentwood, some 20 miles away, coming in with some considerable strength. Fairly hard valves, with some 90 volts on the plates, were used. It is one's feeling, when listening-in on this remarkable receiver, that anything transmitting is within range wherever its location. I have been present during the majority of demonstrations given to readers who have visited the offices of Popular Wireless in order to examine the original model (in response to a general invitation, which is, by the way, still open), and in no single instance have those who have actually seen the set working and have actually investigated its action, had anything but admiration and praise to offer.

Demonstrations of the Set.

London at Thorpe Bay came in strongly on H.F. and crystal, while " Dual " nearly gave loud-speaker signals. These latter were comfortably obtainable with Unit Two plugged in. At Radlett, which is 15 miles from 2 L.O. in the other direction, Birmingham came in with some considerable strength. At Radlett, Newcastle was brought in on a loud speaker using both Units, while Glasgow gave comfortable telephone signals. School of Posts and Telegraphs, Paris, acted a loud speaker comfortably.

Considerable success has been obtained with this set, because one of the most fascinating of all the possibilities of the receiver is that it permits a close comparison between various circuits. The difference between H.F. and L.F. amplification under varying conditions can be closely studied, and careful note can be taken of the behaviour of different valves operating in varying capacities with varying pressures of H.F. voltages. In fact, the possibilities of the set, as any amateur will be able to quickly discover, are almost illimitable.

At the offices of Popular Wireless, Unit One was tested on a frame aerial, and comfortable loud speaker signals from 2 L.O. resulted. With Unit Two "plugged in," these became deafening. Such signals were also the order when Unit One alone was coupled to an outdoor aerial without using an earth. Birmingham came in comfortably on 'phones. At Sidcup, which is 15 miles from 2 L.O., this station activated a small loud speaker with sufficient intensity to fill a small room, using only Unit One on an outdoor aerial. This was also the case when the set was tried at Radlett, which is 15 miles from 2 L.O. in the other direction.

Bringing in Unit Two in either case resulted in deafening signals. Tried at Thorpe Bay, which is near Southend, some forty or so miles from London, Manchester, Cardiff, Newcastle, and Glasgow were comfortably received, although trouble was experienced in some cases from "jamming" by ships.

At Radlett, Newcastle was brought in on a loud speaker using both Units, while Glasgow gave comfortable telephone signals. School of Posts and Telegraphs, Paris, acted a loud speaker comfortably.
IN many telegraph offices there will be found an instrument called the Morkrum teletype. This instrument—which at first glance may easily be mistaken for an ordinary typewriter—is for automatically transmitting and receiving messages over the telegraph line, and has been in use for a number of years.

The Morkrum teletype has a keyboard containing the letters of the alphabet, numerals, and punctuation marks exactly similar to a general typewriter keyboard, and in order to send a message to a distant station by means of this machine it is merely necessary for the operator to strike the various letters on the keyboard, just as if he were typing a letter. In this case, however, the fact of the operator striking the keys causes the message to be automatically printed on a moving slip of paper at the distant receiving station within an extremely short space of time.

In one manual that sooner or later the idea would appeal to someone of using this ingenious teletype for wireless work, and this someone appears to have been Mr. J. H. Brady. The perfected radio-typewriter, however, which embodies the Morkrum teletype, is the work of the U.S. Navy Department and the Morkrum Company of Chicago, and with this radio typewriter it is possible for any typist to send a wireless message in the same way as he or she would type a letter—i.e., by depressing the necessary letter keys. At the receiving station the message is automatically printed on to a moving slip of paper by means of another radio typewriter. For it should be understood that each individual radio-typewriter consists of a complete transmitting and receiving apparatus in itself. A very important point about this machine is that it entails no knowledge of the Morse, or any other code, on the part of the radio typist.

Action of the Typewriter.

When a particular key of the keyboard is depressed, such as, for instance, the letter "A", the transmitting transmitter—to which the radio typewriter is connected—is closed, and a series of electrical impulses are radiated into the ether. This is accomplished by the mechanical action of certain cams and levers working in conjunction with an electric motor and selecting device which are brought into action by the depression of the key, the whole being contained in a compact cabinet behind the keyboard.

Now each letter key on the keyboard is allotted a different combination of electrical impulses, and thus each key on being depressed causes the wireless transmitter to radiate one particular combination of impulses into space.

These impulses on being picked up by the aerial at the receiving station are amplified by a two-stage amplifier, and in this condition actuate an automatic relay recorder, which in turn operates the printing portion of the radio typewriter of the receiving station.

The principal unit of the receiving portion of this radio typewriter is a type wheel containing letters, numerals, and punctuation marks, exactly similar to the keyboard of the transmitting radio typewriter.

On the receipt of a certain combination of impulses by the receiving antenna this type wheel is made to rotate—by means of a delicate and selective mechanism—and print the letter which that particular combination of impulses represents upon a moving slip of paper. Therefore the letter which was depressed on the keyboard at the transmitting station is automatically printed upon this moving slip of paper at the receiving station.

As it was impossible to operate the teletype with the international Morse code the inventors found it necessary to evolve a code of their own. In this code each letter of the alphabet is allotted five units or impulses, the difference between each letter, etc., being that the five units are differently arranged in each case.

For instance, the five units allotted to the letter "A" may be said to consist of two dots and three spaces, as it were. The letter "B" consists of one dot, two spaces, and two dots. "C" is made up of one space and three dots, followed by a space—and so on with each letter of the alphabet.

One obvious advantage of this code is from the point of view of secrecy, for the actual arrangement of the code can be altered at will.

This panel, while being in one piece, is divided into five sub-panels, forming a tuner, a H.F., a detector, and two separate L.F. units.

The input and output of each unit is brought to terminals, so that short connecting wires can be used to connect up whatever valves are required. A crystal detector may be separately mounted, and the output of the tuner or H.F. valve unit connected to it instead of to the valve detector.

A three-coil holder is mounted above the tuner panel, on which itself are mounted primary, secondary, Vernier, and reactance variable condensers. The circuit of each of the three coils is broken and brought to six terminals at the extreme left of the panel, so that after short-circuiting the coil plugs any type of timer may be connected up to the set by means of the six terminals.

The H.F. panel is designed to give either transformer or tuned anode coupling to the grid of the detector valve, the connections for one or the other being made by moving the four-pole two-way switch either to right or left. The anode coil is large enough to tune to 2,000 metres, but loading coil terminals are provided.

Grid Control.

Anode tuning is controlled by means of a nine-stud switch and a 00002 mfd. variable condenser, which also tunes the primary of the plug-in H.F. transformer when it is in use.

Grid potential is varied by a potentiometer, operated by a ten-stud rotary switch. Two sets of reactance terminals are provided, so that regenerative effects can be obtained either on the aerial secondary coil or on the anode coil.

The detector panel is of the usual type, but carries a variable graphite grid leak.

The L.F. panels are also standard, and, of course, one or both may be used as desired.

One pair each of L.T. and H.T. battery terminals are provided, wires from which run to all the valves; but only those valves actually in use need have their filaments glowing, as a separate resistance is fitted to each valve.

As will be observed from the illustration, all the valves are mounted inside the cabinet, but the condition of the filaments may be readily seen through peep-holes.

Though this particular set employs four valves, a smaller or larger one on the same system is, of course, practicable, and would be as likely to prove successful as the one here described has certainly been.
Consequent upon the increased demand and improved methods of production, resulting in decreased manufacturing costs, the General Electric Co., Ltd., have pleasure in announcing the following substantial reductions in the prices of GECOPHONE HEADGEAR RECEIVERS.

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SUMMERTIME WIRELESS.
By OSWALD J. RANKIN.

Describing some useful circuits, suitable for portable work, illustrated with some of the author's well-known pictorial diagrams.

As in the case of ordinary stationary installations, it is not possible to specify the exact range of any particular receiver. So much depends on the existing conditions, locality, the amount of care taken in constructing the apparatus, experiments, and—the individual ability to carry out experiments. With portable sets it is possible to take a train journey and erect the installation within a short distance from the broadcasting station, so that even with a fairly simple type of receiver one is enabled to "make ends meet," so to speak.

The selection of any particular type of receiver will, of course, depend on the distance between the proposed temporary receiving station and the transmitting station. For general purposes, a suitable circuit which will compare very favourably with the single-valve receiver in the ordinary way, is the Flewelling super-regenerative circuit shown in the pictorial diagram Fig. 9. This is probably the most efficient single-valve receiver yet devised, and it is extremely simple in construction and operation. It is adaptable either to the ordinary single aerial or to the frame aerial previously described. The tuning coils B and C, giving about two-thirds of the inductance of the primary coil B, Nos. 50 and 35 gauge wire, can be quite suitable, and an ordinary loose coupler or vario-coupler will also give good results.

Important Details.

The variable condenser D, which shunts the primary coil, should have a maximum capacity of about 0.005 mfd., and sharper tuning may sometimes be obtained by connecting a 5-plate Verrier across the terminals. These condensers and the filament rheostat should be well shielded in order to prevent body capacity effects. F is a variable grid resistance with a value from 1 to 1½ megohms, and G is a similar component, being continuously variable from ½ to 1 megohm.

H is an ordinary 0.002 mfd. mica grid condenser connected in shunt with the variable resistance F, which, of course, is in series with the aerial lead-in and the grid of the valve. The three fixed condensers, I, J, and K, each have a capacity of 0.006 mfd., the exact value being a rather critical factor. The tuning will be rather difficult until the operator has become acquainted with the various adjustments.

Efficient Reflex Circuit.

Place the variable resistance F to its maximum value, and vary the coupling of the coils until a whistling noise is heard in the headphones. The coupling and variable condenser should be continuously adjusted until the desired signals are heard, when it will then be necessary to readjust the variable resistances, which are then left at the best positions while the signals are finally tuned in by making further adjustments of the coils and condenser. A good hard valve should be used, and great care should be taken to see that all the connecting wires are well insulated and well separated from each other.

Fig. 10 represents a pictorial circuit diagram of a double amplification or "reflex" valve-crystal receiver particularly suitable for portable work. The single valve functions as a high and low-frequency amplifier simultaneously, rectification being accomplished by a crystal detector. The simple slide inductances B and C are identical in size and capacity, and to enable both coils to be tuned to the same frequency a 0.005 mfd. variable condenser D is connected in shunt with the active turns of the coil C. Both coils should be 6 in. long by 3 in. in diameter, and wound with No. 22 enamelled wire.

The secondary side of the low-frequency inter-valve transformer F, which is in series with the earth lead, and the common negative line, is shunted with a 0.001 mfd. fixed condenser G. A fixed condenser H, having a capacity of about 0.01 mfd., shunts the telephones and the high-tension battery; and I is the usual telephone condenser, which is not essential, but desirable. The most admirable feature of this circuit is the entire absence of distortion, and it is also extremely simple in construction and manipulation.

The signals are first amplified in the aerial circuit, then rectified by a well-adjusted crystal, then fed back into the valve again to be amplified at low frequency, and finally delivered to the headphones at a greatly increased strength. This is one of the very best single-valve circuits particularly suitable for portable work, since the few necessary components may be conveniently arranged in an attaché case or small box.

There are, of course, many existing two-valve receivers which, under normal conditions, would be quite suitable for portable work. The usual outfit, comprising one valve rectifying and one valve L.F., will sometimes give excellent results; but a stage of H.F. is always desirable, since we are concerned with a more or less inefficient aerial system. The two circuits to be described indicate examples of the most suitable types of two-valve receivers to use with a make-shift aerial. These are ordinary receiving circuits, the first, Fig. 11, employing one stage of H.F., tuned anode reactance coupling, and valve rectification; the second, Fig. 12, employing one stage of H.F., crystal rectification, and one stage of L.F. The latter has been adapted to the frame aerial for sake of variety.

A Two-Valve Set.

The circuit shown in Fig. 11 is selected because it is highly efficient and easily handled. Two standard coil-holders will be required, one for the primary and secondary aerial tuning coils B and C, and the other for the anode and reactance coils F and G. The secondary aerial coil C is shunted with

(Continued on page 922.)
SUMMERTIME WIRELESS.
(Continued from page 921.)

a .0003 mfd. variable condenser, D, and a .0002 mfd. variable condenser is similarly connected to the anode coil, F.

An ordinary mica grid condenser, I, is placed in series with the plate of the first valve and the grid of the second valve and the grid leak. J, is in series with the grid of the second valve and the positive low-tension line. K is a 2 mfd. Mansbridge type fixed condenser connected in shunt with the telephones and high-tension battery. If desired, either or both pairs of honeycomb coils may be replaced by basket coils. Basket coils may also be used, the amount of winding in each instance being determined by experiments and the particular wave-length it is desired to work on.

Using a Frame.

Fig. 12 represents another very efficient two-valve receiver which is a hot favourite with the author. It is here shown connected up to the outdoor frame aerial previously described, and it was this combination which gave the remarkable results mentioned in an earlier chapter. A is a diagrammatic impression of the frame aerial, and B presents the .00075 variable condenser. A five-plate Vernier condenser connected across these terminals will sometimes facilitate sharper tuning. C is a No. 50 Igranic honeycomb coil, which is in series with the plate of the first valve and the L.P. terminal of the low-frequency inter-valve transformer, and D is a .0003 mfd. variable condenser connected in shunt with this coil.

E is a .001 mfd. fixed condenser which shunts the primary winding of the transformer, and another of .002 mfd. capacity is connected across the telephone terminals. Y and Z represent the two points where the leads from a tuning coil would be connected if it was desired to use the ordinary aerial and earth system. In this case the frame aerial and the large capacity variable condenser would be dispensed with.

The one drawback with portable outfits is the accumulator. During the hot summer months one seldom feels energetic enough to carry masses of lead plates across rough country fields, and for this reason I have not described anything more ambitious than a two-valve receiver. These outfits will give several hours’ enjoyment using a “respectable” size accumulator, say, 4 volts 20 amper hours; and even this size may be modified when using certain types of valves.

My theme has been to show the average enthusiast how it is possible to extend his efforts to the open air, and receive the usual broadcast programmes throughout the summer without experiencing that “boxed-up” sort of feeling which creeps upon us with the coming of the brighter days. Those who regard the hobby as a serious pursuit rather than a novel form of amusement, and who intend experimenting on long-distance reception, will, of course, know that the receivers described in the foregoing chapters are essentially broadcast receivers, and that it will be necessary to modify these circuits to suit individual requirements. For long-distance reception with portable outfits I would recommend the use of not less than two stages of H.F. amplification with reaction.

Crystal Advantages.

Concerning loud speakers, I do not hesi- tate to advise the use of a single-valve power amplifier having a separate high and low-tension current supply. The best results will be obtained by using a good crystal detector, since a crystal will rectify all frequencies equally well without undue distortion. This is where the crystal scores over the valve, and there is no doubt that the ultimate success of the loud speaker will be attributed to the crystal.

THE CONSTRUCTION OF VALVES.

These two photographs, taken in the factory of the Coscor Valve Co., Ltd., illustrate two of the operations involved in the manufacture of thermionic valves. On the left is shown the machine that mounts the filament wires, while on the right the operator who cuts the wires to the correct length can be seen at work. The tungsten wire employed is very brittle, and extremely careful handling is required, otherwise considerable wastage would result. The factory hands are mostly girls, and it is said that they are more suitable than men for such delicate work. A high degree of efficiency is attained by these workers, who are mostly quite young, and it is a most interesting experience to walk around the factory and watch them at work.
THE NEW MANCHESTER STATION.

By Our Manchester Correspondent.

On Thursday the 2nd of August, 2 Z Y closed down at Trafford Park and re-opened again the following day at its new position in Dickenson St., Manchester. Full details of the new station and important changes in the staff are given in this article.

A FORTNIGHT ago the Manchester broadcasting station was removed with fitting ceremony from the out-of-the-way building in Trafford Park to the top floor of 57, Dickenson Street, just outside the imposing corporation power station. One half of the upper floor is occupied, and the aerial suspended from the top of the power-station chimney to one of the windows of the transmission room. The studio is considerably larger than that of the old station, being about 30 feet long and 14 feet wide, compared with the former room of 24 feet by 14 feet. It is, of course, smaller than the new London studio at 2, Savoy Hill, which is 40 feet by 20 feet. On one side of the studio is a tastefully furnished green room for artists, who enter it directly from the lift. On the other side of the studio is the transmission room, containing the new equipment specially designed and built by the Radio Communication Co., Ltd., of Barnes.

Up-to-Date Apparatus.

This set embraces all the advantages of the latest improvements, and is controllable by one operator, who can check all the necessary apparatus and other fittings by consulting all the meters in front of him, and at the same time controls the musical quality and strength of the transmission. He also has visual control of the studio through a sound-proof window by his side, so that any necessary alteration in the position of the artists, and so on, may be carried out immediately by his instructions. The power from the corporation 400-volt D.C. mains is converted by a motor generator set supplying current at 5,000 to 8,000 volts to the transmitter. This generating set is in duplicate in a room removed from the transmitting room together with two duplicate battery-charging sets driven by five horse-power motors. The low-tension and high-tension batteries are housed in separate gas-tight compartments with controlling switchboard energy machines.

There are also directors' offices, where the many callers may be interviewed, and quite an imposing orchestral room, where the members of the orchestra or band may retire between turns and, if necessary, rehearse without disorganising the studio arrangements. The spacious general office, in which the heavy daily audition common to all provincial stations is carried out by the station staff, contains a sound-tight telephone box, in which the nightly news bulletin will be received from London by a special night operator. All rooms are easily accessible from the entrance of the lift or from the alternative staircases by a central passage.

Old Station "Closes Down"

The closure was applied at the old station on Thursday, August 2nd, when, in addition to the programme, arrangements were made for special items reminiscent of 2 Z Y. These contributions related not so much to the difficulties of the station as to the personnel aspect of it. The old familiar voice of Huntpy-Dumpy, Mr. Z. Rastus, and Masa Johnson were heard again. Unfortunately, the Cloud Lady and Mr. X were at the time on a well-earned holiday.

The old impromptu talks which were given by the staff, and were quite effective, were rearranged, and made an interesting feature of the programme, while the chat on the technical equipment of the whole station, and a little demonstration of the efficiency of microphones, also provided an attractive interval. After this the end came with the charred ghost, who, finding everywhere deserted, buried the carrier wave with a low, dying heterodyne note.

Memorable Evening.

There was no break in the service to listeners-in, for the next day the new station was opened with due ceremony. Arrangements, in fact, were made for the usual afternoon concert, which was provided by the Oxford Picture House orchestra. The opening night had all the appearances of being a memorable one in the history of Manchester broadcasting. In the first place, Lord Gainford, the chairman of directors of the B.B.C., was due to speak, and Sir Wm. Noble, another director, and Mr. J. W. Reith, general manager, along with many civic notabilities, were expected to be among the distinguished gathering. Following the speeches, there was to be a musical programme by the band of H.M. Irish Guards, with Miss Florence Holding as the soprano, Mr. Lee Thistlethwaite baritone, and Mr. Victor Smythe the entertainer. It is interest-

A demonstration was held at the Bronx Zoological Park, New York, recently, in order to study the effect broadcast music had on the animals. The bears enjoyed it immensely and danced to the music, but the lions roared with rage.
WIRELESS FOR SHIPS' BOATS

The above illustrations depict a proposed system of adapting wireless to ship's boats in order to enable survivors of vessels in distress to continue transmitting S O S signals. Each apparatus thus installed would have a range of 50 to 100 miles.
At Sea—Wigan Pier—Local Colouring—Buzz-x-z—The Honeyed Phrase—Parasitic Noises—Animals as Inventors.

At Sea.

AN American scientist suggests that experienced meteorologists should be distributed on ocean-going vessels, so that one or two would be always at sea. The meteorologist at sea, he suggests, would receive weather reports by wireless and issue weather forecasts to the land stations, also by wireless.

The only difference between the newly-proposed system and the present system is that in the latter all the weather prophets are usually at sea.

Wigan Pier.

The broadcasting programmes radiated from Manchester have been heard in the Wigan coal-mines. This item of news has been received with great enthusiasm by Wiganites temporarily domiciled away from their native city. Every man of the crowd was at his place in the front row while the inevitable question was fired at them. “Ah, but have you heard of the dancing to wireless music at the end of Wigan Pier?”

Local Colouring.

The conversation turned on noteworthy achievements in the reception of wireless signals from far-distant stations. Over in the corner sat a little man with a white, pointed beard. Breaking into the talk for the first time, he remarked:

“I have enjoyed the story of your achievements, gentlemen, but I think I can go one better than most of you. On my valve set I can manage Manchester so well that you can hear the spinning cotton.”

That started it.

“Nothing funny about that,” said Nettleton. “Speaking seriously, when I get Cobourg about midnight the reception is so good that you can fairly smell the scent.”

“Don’t be such a conformed ass!” said Jimmy Gallipot. “Talking of Continental stations, I know a schoolboy who gets Ostend so clearly that he can hear the rabbits running about the quay.”

“Silly idiot!” broke in Heaviside. “I don’t believe a word any of you have said. You can believe me if you like, but when I pick up Tenerife on my super-seven, I can hear the Canary Islands whistle.”

Buzz-x-z.

The chairman of the Newcastle and District Beekeepers' Association recently gave an address on beekeeping from the Newcastle station. After the address a bee was placed on the microphone and the buzz of the insect was broadcast to listeners-in. Which reminds me very forcibly of a schoolboy friend of years ago who had the wonderful faculty of being able to imitate a buzzing bee in true ventriloquial style. It was as far from a buzz as two schoolboys sitting next to him in church.

There was a good old gentleman who used to sit in front of us. I have seen him descend suddenly from the loftily heights of an eloquent sermon to the soulful reality of a bee buzzing about his ears. That same boy used to try it on at school occasionally, but the effect was not quite so good there, and the chances of capture (of the buzzer, not the bee) were much greater. There was the possible penalty at school of so many “times” or so many hours of “extra drill,” or worse than those forms of mild punishment—the whizzing stick, which stings over a greater area than a buzzing bee.

The Honeyed Phrase.

One little incident has remained fresh in my memory of this ventriloquial schoolboy chum of years ago. It was a history lesson, and we were putting up with it as best we could. Our history master was a curios mixture. Sometimes he was funny, sometimes he was boring. His stock phrases included William the Conqueror (date of phrase 1066), Edward the Conqueror (date of phrase 1840), and Inky Stephen, a potty joke. We had read a chapter together more or less, and we were learning its contents with a view to questions. Everything was dead dull and dull, when gradually there arose the sound of a buzzing bee. Louder it came, and still louder, just as if the bee had been in the window and was hovering over the heads in the front row. You can imagine how thoroughly we enjoyed it and how much we admired the courage and effrontery of my ventriloquial friend Woodhead. The bee appeared to settle and the buzzing ceased. Then there arose the high-pitched, sarcastic voice of David, our dear dealer:

“Woodhead, I should advise you very strongly not to make a business of that sort of thing. There is a cure for it—the bees whacks cure.”

Parasitic Noises.

If the buzzing bee performance as performed at Newcastle catches on well, no doubt we shall hear many strange noises in our telephones.

To determine whether those noises come from the transmitting station or from the receiving set itself.

A famous Indian scientist has photographed, by means of a wonderfully sensitive piece of apparatus, the sounds emitted by a vibrating insect. Perhaps there will be developments of this kind of thing so that our broadcasting programmes will include items such as these in the future:

1. The howl of a skinned banana.
2. The high-pitched whistle of a boiling caldron.
3. The peals of laughter of an orange being prepared for the fruit salad.
4. The chromatic scales of a prima donna mackerel. And
5. Mixed melodies of an uncooked sausage.

Animals as Inventors.

According to the “Wireless Review and Science Weekly,” special observations of the intelligence of chimpanzees have been made recently, and the results of the observations have revealed that the chimpanzee has a certain amount of inventive genius. The chimpanzee is not alone amongst the animals in this respect.

Many years ago the domestic cat perfected a system of face washing which for ease of manipulation has never been equalled by man with his soap and water methods. The fox terrier long ago thought out a wonderful game of hide-and-seek (played with ripe bones) which is streets ahead of any hide-and-seek game that children play.

In the distant past the honey bee invented a system of geometrical configuration which has been the surprise and envy of the geometricalian ever since. The trapdoor spider invented the hidden pit method of capturing flies centuries before the method was used to win some of the world’s most famous battles.

Last, but not least by a long chalk, the beaver must be given the credit for being the inventor of the dam water system.

Readers are invited to submit the results of their experiments in the form of short constructional articles. If accepted for publication they will be paid for at our usual rates.
CARDIFF STATION NOTES.

A few interesting items concerning 5 W A and its staff.

COMRADIOS had a warm welcome for “Mr. Everyman” upon his return to us last Monday. The evening edition of the “Western Mail” voiced the popular feeling in a happy cartoon: “Mr. Everyman Speaking.” This depicted a burly “Comradio” standing before a loud speaker, shaking hands with fantastic wireless wave that poured out, and exclaiming: “Glad to hear you again, sir.” Very appropriately, “Mr. Everyman” devoted his return chat to “New Friends and Old,” and charmed everyone.

Miss Haidee Gunn, the distinguished Shakespearean actress

What an extraordinary power for good or ill “Mr. Everyman” must wield! We speak of the pen being mightier than the sword, and the value of the written word diffused by a great journal amongst a million readers. But here is a man who, nearly every night, is affectionately welcomed in thousands of homes as an intimate personal friend of the family, and actually speaks to young and old sitting by their firesides. How can he fail to exercise a strong influence upon thought and action? And especially so since he possesses in marked degree that most valuable attribute of a public speaker—sinewy. Even in so trilling a topic as “The Passing of Door Knockers” he exerts influence. For I heard of two cases at least where a daughter and a nephew went out next day and purchased sets of tiny brass knockers for presents.

Listening-in, Popular.

One is often tempted to speculate upon the effect of “broadcasting” generally down here in the West Country. Here are folk listening to the great masters of music and literature for the first time in their lives. What are their feelings? The station director showed me a letter the other day from a farmer’s wife in Somerset. She wrote that friends walked twelve or fourteen miles to hear her three or four times a week to “listen in.” This music and poetry and drama must mean something to them. “We haven’t been able to get to a theatre or hear any music for twelve years,” wrote another. “Comradio” is to us your entertainments are too wonderful.” It is well that folk like these are in such safe guiding hands. By the way, what curiously warped ideas some persons possess. A man wrote to the director complaining about the inclusion of a programme of that very popular song, “We’re coom up from Someret.” He said that it was an incitement to militarism!

For obvious reasons a station director gets any praise or blame that may be going; his second-in-command is little heard of. But Cardiff is very fortunate in having such a deputy chief as Mr. W. N. Settle (“Uncle Norman” to the little folk), and the appreciation of Mr. Settle, published last week in the leading West Country journal was well deserved. A sound and courteous business man, a hard worker, and a loyal chief-of-staff. Mr. Settle is certainly a distinct asset to the station and to the Broadcasting Company. We like him down here.

Classical Items.

A very fine Wagner night last Sunday included the Preludes to “Parsifal” and “The Mastersingers,” and the “Siegfried Idyll.” We have one Wagner and one Beethoven night every month. The complete series of Beethoven Symphonies (except No. 9) is being presented. The Sunday programme is certainly the most popular of the week.

LATIN—AMERICAN RADIOGRAPHIC NEWS.

Progress in Argentina and Venezuela—Success Attends Colombian Installation—Central American Enterprise.

By P. F. MARTIN, F.R.G.S.

Radio-Telegraphy is making sensible progress in Argentina. The latest arrangements include the establishment of apparatus and a club at Mentolaza, the capital of the province of the same name. By means of the apparatus, concert programmes are broadcast from the Radio Club of Buenos Aires.

The Argentine Government has decided upon the purchase of two radio- plants for the use of the army, consisting of a portable set to cost $42,000 (gold), and equipment for a 6-kw. radio station to cost $40,000 (gold). It is understood that both plants will be furnished by the Marconi Wireless Telegraphy Company, Ltd. The existing laws in Argentina provide that privately owned radio stations are permitted only for inter-continental communication; these being under the jurisdiction of the Ministry of Marine or the Ministry of War.

Many New Stations.

The former Department controls all stations located within 100 miles of the sea or the River Plate, and within fifty miles of either bank of navigable rivers; while the Ministry of War controls all other stations in the republic. Of the forty-one existing stations of the army and navy, thirty-five are now being used for commercial traffic. Authorisations for new stations are granted for commercial reasons, as well as on military or naval grounds.

The Compañía Transradio Internacional is about to erect a wireless station at Monte Grande, located on the Buenos Aires Great Southern Railway. This construction will prove one of the most powerful stations in the world.

In Brazil, a concession to install and operate for forty-five years radio-telegraph and radio-telephone stations for international communication has been granted to the Sociedade Central Brasileira do Teatro. The company, which has been established with Brazilian capital, is now successfully operating radio-telephone stations for communication within the national territory, but its concession strictly excludes radio-telegraphy in that field.

Notable Progress.

The receiving station of the Sociedad Anónima Agencia Havas, one of the first radio-telegraph enterprises to be established in Brazil, has recently secured an extension of its concession granted as far back as 1894. Since August, 1923, it has been receiving station at Praia Vermelha has lately been opened for international service.

The past year has proved notable for the progress of radio communication in Venezuela, which was one of the first in South American republics to institute a chain of radio stations throughout the state. The service is under the control of the Minister of Promotion (Ministro de Fomento), and the present occupant of that office, Dr. Gumersindo Torres, a man of far vision with great faith in the value of radio-telegraphy for Venezuela, seeks to encourage foreign contractors and manufacturers of electrical installations to assist in developing radio communication in the country. Another official, who is familiar enough to admit of free competition, is General Tobias Uribe, Chief of Communications, under whose guidance, very considerable and knotty problems, dealing with the establishment and conduct of the service, have been solved. A third official, Señor H. Eichwald, who, although bearing a Teutonic name, is a Venezuelan by birth, has in his hands the technical control of the stations, their installation and maintenance, also that of the apparatus for training operators for the wireless service of the country.

Loud-Speakers Introduced.

An influential radio association is being formed in San Salvador by a group of citizens who propose to equip the parks and other public places of that city with loud-speaker radio-receiving stations. These will be used to disseminate market quotations for coffee, grain exchange rates, official time, concerts and late Press reports. The association, which has been constituted to form a group to sell receiving apparatus and to instruct purchasers in the use of the instrument. Authorisation has also been given for the purchase of amplifiers and improvements. The formation of wireless stations. Radio-telephony has become extremely popular throughout the Central American states, but more particularly in El Salvador, which offers an excellent market for radio apparatus.
PROBLEMS arise in every phase of life, and the power of concentration does not always solve them, but when the problem is one of valves you can see The Thinker straightening his heavy back and smiling because there is only one solution—

Mullard

Obtainable from the Leading Electricians, Wireless Dealers, etc.

Advt. of the Mullard Radio Valve Co., Ltd., Balam, S.W.12.
The issue of this now famous journal, on sale August 21st, will contain many special and attractive features of great interest to all wireless amateurs and those interested in popular science.

Professor A. O. Rankine writes on the "Speaking Film" device which he has invented; Dr. E. V. Appleton on "Electricity in the Atmosphere"; and Dr. N. W. McLachlan on "How to become a Radio Engineer"—the last article being of especial interest to readers anxious to take up wireless professionally.

Other useful articles include instructions for constructing Experimental Transmitting Apparatus, the Principle of Dual Amplification, How to make a Three-valve Panel, a Charging Board for Accumulators, a Series Parallel Condenser, and many other practical features. "Wireless Review and Science Weekly" is in reality a Monthly Magazine issued Every Week at the low price of 3d.

Its contributors are the best obtainable, its appearance, make-up and design most attractive, and its practical value to the amateur and student universally recognised.

Order your copy now and see for yourself what an excellent all round journal it is.
WHEN component parts used in wireless construction are purchased from dealers there is always a possibility that large stocks may include certain parts which are not accurately machined in some respect, and this is especially the case with regard to components having threaded portions. With constant use the taps and dies used by the makers become worn; and if for any accidental reason such tools are kept in service after the point of wear limit has been reached, inaccurate production ensues.

Constructing a Die-Plate.

Such considerations, apart from any desire to produce threaded components in the home workshop, make it necessary for us to investigate the best forms of screwing tackle to use in wireless construction. The form of thread used for scientific instruments, which category includes wireless apparatus, is known as the British Association Standard Thread, recognised by the initials B. A. It is preferred to standard Whitworth on account of its suitability for small screwed parts, and is identified by numerals from 0 to 25. For our particular purpose, however, the complete range of sizes is unnecessary, and the amateur who makes use of bought components which may require easing on the threaded portions, will find a simple plate and set of taps can do the job.

Die-Plate, B. A.

The plate is now dead hard, and if so used would soon become broken or chipped, therefore to retain the cutting edge without risking fractures the plate must be tempered or "let down." After polishing the surfaces with emery cloth the plate is held over a gas flame until the polished surface begins to assume a straw colour, a few seconds later the straw colour will darken and before it merges into the darkest shade, the plate must be dipped quickly into cold water.

Unless readers are accustomed to tempering tools it will be well to practice on a piece of cast steel or silver steel before attempting the process on a finished tool, for the changes of colour follow each other so rapidly that before one is aware of it the steel turns blue, which gives too soft a finish for any class of cutting tool. The following table shows how temperatures may be judged by colours, and the colours at which various tools should be tempered:

### TABLE OF TEMPERATURES AND TEMPERING OF TOOLS.

<table>
<thead>
<tr>
<th>Degrees Fahr.</th>
<th>Colour for Tempering</th>
<th>Class of Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>430</td>
<td>Very pale yellow</td>
<td>Scissors and small scrapers.</td>
</tr>
<tr>
<td>440</td>
<td>Light yellow</td>
<td>Larger scrapers, centre punch points.</td>
</tr>
<tr>
<td>450</td>
<td>Dark yellow</td>
<td>Points of dividers, edges of shears, small chisels, die plates and taps.</td>
</tr>
<tr>
<td>500</td>
<td>Brown yellow</td>
<td>Large chisels and small flat punches.</td>
</tr>
<tr>
<td>520</td>
<td>Brown purple</td>
<td>Ends of screwdrivers.</td>
</tr>
<tr>
<td>530</td>
<td>Dark purple</td>
<td>Springs.</td>
</tr>
<tr>
<td>500-570</td>
<td>Dark blue</td>
<td></td>
</tr>
</tbody>
</table>

A set of die plates and taps such as those shown in Fig. 1 will cost about 4s. 9d., but amateurs who desire a rather more elaborate equipment can purchase a very useful screwing set for about 15s., which will last for years with ordinary use.

A very neat set known as the "Little Giant" can be obtained from tool dealers (Fig. 3) and consists of a wooden case, five dies, five taps, a die holder and a tap wrench, the set being capable of cutting threads of 0, 1, 2, 3, and 4 B. A.

The parts are shown individually in Fig. 4, the types selected being suggested as the most convenient for amateur use. When purchasing separate taps, they should be
MINOR VALVE-SET REPAIRS.

A few remarks concerning the interior of valve sets intended for the guidance of those readers not thoroughly conversant with the "innards" of their receivers.

COMMONSENSE is the most important asset an "amateur mechanic" can possess, and most people have quite a lot if they will only use it. For instance, supposing it is decided that it is necessary to remove a screwdriver to remove the ebonite top. Don't jerk up in their entirety when the panel is raised, it is just possible that unless due precautions are observed you will find you are tearing apart soldered joints and leads. Although most sets come away in their entirety when the panel is raised, it is just possible that in the particular set that you are dealing with some of the gear is mounted in the interior of the case itself. However, having carefully removed the panel, the next thing is to carefully stand so that no weight is brought to bear upon any delicate parts as the vanes of a variable condenser, grid leak, etc.; in fact, it is generally the best plan to lay back the panel in its correct position whilst not referring to its underside. It need hardly be added that during these operations all valves and external connecting leads should be removed.

Quite a common occurrence, and one that can be very easily dealt with, is for the locking nuts of a terminal to work loose and cause a loose or broken connection in the circuit. The more continually used terminals, such as the L.T., and A, and E, are, naturally, the chief offenders. Having worked loose, a turn of the terminal inadvertently performed while connecting the set up will generally break the soldered connection internally made to it, and apart from the fact that this will prevent reception, it is always liable to cause an internal short-circuit, with all sorts of resulting damage, buckled accumulator plates, burnt-out valves, etc.

The Filament Rheostat.

When replacing the panel of a valve set always carefully run over the interior "lay-out," removing dust and arranging the wiring so that each lead is as far from all the other leads as possible. See also that no lead is in such a position that it will be bent back on to another or dangerously near to anything else when the panel is pressed down. Have a look at the filament resistance, and if the wire along the point of contact appears to be rather dirty, carefully clean it. Should the resistance wire along this same point of contact appear to be burnt or blackened, then the chances are that the current is "arcing" along that point, or sparking as the filament knob is twisted. This will cause horrible grating noises in the 'phones. As filament resistances vary so vastly in point of construction it is hardly possible to venture even a general remark on the adjustment of the moving contact, but it can clearly be seen whether a firmer contact is necessary, and doubtless "commonsense" will provide the amateur mechanic along the path of safe and correct procedure.

Try the effect of varying the value of the grid leak by running a pencil line along the grid leak. The thicker the line the less will be the resistance of the leak. Start with a very, very thin line, and if it does not improve results don't carry on, but if it does, then thicken it slightly, no more. After that, leave it, otherwise you will do more harm than good.

The great thing is to start with a truly vertical hole,—I shall give a few hints on drilling in another article—but for the moment it may be assumed that this condition is already fulfilled. "The natural tendency of a tap is to start its downward path in an oblique direction, and unless this tendency is corrected from the start the tapped hole becomes more and more crooked.

Use of Square.

One may be blessed with a fairly "straight" eye, and yet manage to start a tap or die crooked, therefore it is best not to trust the eye too much, but make quite sure the natural perversity of the tap is overcome by introducing it to a square. The application of the square in the manner shown in Fig. 5 by itself is not enough, for if the tap is made to be against the square in the first place it will "back" so to speak, by dogging the square the other way. So it is necessary to try the vertical accuracy in two directions,—i.e., from the side and the front,—and once it is started in these conditions it will give up the unequal combat and go straight.

Dies can be started so as to cut true threads if the round stock to be threaded is provided with a slight chamfer, but care must be taken to ensure that the chamfer is concentric with the diameter of the stock, otherwise the die will run down out of truth. When tapping holes no downward pressure on the tap is needed as the tap feeds itself into the material being cut. Jouting or clogging of the taps, which is often a preliminary to breakage, can be avoided if the direction of the motion of the wrench is reversed occasionally. This movement reveals the cutting edges and allows particles of metal to collect in the flutes of the tap, thus preventing tendencies to clog or jam.

(To be continued.)

INEXPENSIVE TOOL KITS FOR WIRELESS AMATEURS.

(Continued from page 229.)

bought in pairs,—i.e., taper and plug. Taper taps are very useful for threading holes in wooden cases, for by leaving the threads shallow, the screws fitting into panels, etc., finish cutting the thread whilst being forced home, thus securing a better fit than when the same thread is finished with the plug tap.

The circular adjustable die is made from well tempered steel and consists of one piece, a small set screw being provided to regulate the die to cut full or shallow threads as required (Fig. 4). They are all made of a uniform external diameter and depth, thus enabling them to be used in the kind of the die holder illustrated. For the larger sized taps a double ended adjustable tap wrench is useful, but as even the smallest of these will be heavy for small taps, it is advisable to procure a watchmaker's tap wrench on fragile taps so as to be enabled to save risks of breakages.

Even with the best screwing tackle obtainable the results will be very disappointing unless due precautions are observed in using the appliances. A good many amateurs, and professionals, too, go wrong because insufficient care is taken in squaring things up before a start is made.
SOCKET TERMINALS.

To the experimenter, any device which tends to facilitate the making of alterations to a circuit when "trying out" various arrangements is always welcome, and to that end several contributors have recently advocated the use of valve sockets and pins. The following method has been very successfully used by the writer for some time, is capable of considerable adaptability, and combines the flexibility of the "plug in" socket with the relative permanency of the terminal.

The sketch attached shows the whole idea, which consists in soldering a small socket on to the top nut of a terminal. Valve sockets, with the threaded part removed, are suitable, but rather unsightly, and the writer therefore used the sockets from an old tapped H.T. battery, which proved neat in appearance and much more easily soldered.

Before soldering, the lacquer on the terminal nut should be removed with emery cloth and the bottom of the socket filed flat. The nut should also be plunged with wood level with the top, to prevent the solder blocking up the inside thread. A little solder is run on to the terminal, and the socket placed on top and held in position with a pair of pliers. The hot iron is then applied to both socket and terminal for a few seconds, and a permanent joint ensues.

A SIMPLE PERIKON DETECTOR.

First obtain two pieces of ebonite 2 in. by 1 in. by 1/2 in., and drill in each three holes large enough to pass a 4 B.A. screwed rod, one at the centre, and one each side 1/2 in. from it. The centre hole is now enlarged until it is just a shade smaller than the thinner end of a 4 B.A. terminal head, which should be preferably slightly roughed.

Having passed a piece of copper wire round the head, it is gently tapped with a hammer until the smaller end fits tightly in the hole prepared for it. After fitting a head in like manner to the other piece of ebonite, a piece of glass tube 1 in. long with a 3/8 in. bore and holding two crystals is placed between them, and the whole is kept in position by passing two short lengths of 4 B.A. screwed rod through the other four holes and tightening up by means of nuts.

Two further lengths of the same rod, the ends of which should be fitted with small ebonite knobs, are then screwed through the fixed heads until they make good contact on the crystals. The wires from the fixed heads should be joined to alternate screwed rods, which may be fitted with terminal heads and washers.

A FEW TIPS.

Before going to the expense of buying a 60-volt H.T. battery, it is advisable to borrow a battery and see what voltage the plate requires, as very often they do not need nearly as much as stated by the manufacturers. Dutch valves, for instance, will work satisfactorily on as little as 12 volts, and sometimes will not give good results on anything over about 20 volts.

Ordinary sealing wax makes a good insulator. Insulated knobs can quickly be made by dipping a screw head into molten wax, which cools instantly after being immersed, and a very neat appearance results.

Sometimes it is very difficult to separate two stations that are both on practically the same wave-length as the Vernier condenser is not precise enough. Try the following tip with your existing Vernier, which will give very exact tuning. Take out the moving vane and on one of the radii (neglecting the round projection where the spindle goes) describe a semi-circle on the vane. Now cut out this semi-circle and the vane will then come to a point, giving extremely accurate tuning.
AN EFFICIENT ONE-VALVE SET.

An interesting circuit claimed to give remarkable results over long ranges of reception.

A single valve set, for use with a low voltage, or null emitter valve, that has created a great deal of interest in America, is described by P. F. Albritt in a recent number of the "Radio World."

A diagram of the set will show the reader that the wiring of the instrument is carried out on almost orthodox lines, and while nothing new is claimed for the apparatus in this respect, it is stated that the circuit given is remarkably efficient for long-distance working, and that the strength of signals received will compare favourably with most other sets employing only one valve.

The Variometer.

It will be noticed that a departure from the ordinary type of single valve circuit is a lead which connects the aerial with the plate circuit of the valve. The variometer, also, is somewhat novel in design. This was made by constructing the inductance out of a cardboard tube three inches in length and three inches in diameter, the winding consisting of fifty turns of No. 22 D.C.C. wire wound on to the former in the usual honeycomb manner.

Mounting the Coils.

Two further coils are then wound round the other end of the tube, as shown in the diagram, each coil consisting of four turns of No. 22 D.C.C. wire. These coils, for the sake of simplicity, might be referred to as a winding of eight single turns in two separate groups of four turns each, with a distance of about three-eighths of an inch between them. This distance is allowed to permit of the mounting of the rotary coil, which is constructed from another cardboard tube of one inch in length, and of as large a diameter as will permit of its being rotated inside the stationary tube without touching the inside of the latter.

The rotating former is also wound with eight turns of No. 22 D.C.C. wire, the windings being spaced in a similar manner to the eight turns previously dealt with—i.e., in two groups of four. This coil is mounted on the supporting shaft in such a manner that the windings come directly under the stator windings, as shown in the illustration.

Variable Leak Advisable.

The three coils described are joined up in series and connected in the circuit as shown. It will be observed that the received signals from the aerial first pass through the rotor coil, then through the two groups of windings on the stationary coil, and finally through the honeycomb coil.

It is claimed that a variometer constructed on these lines acts as a Vernier on the inductance, and increases to an appreciable extent the selectivity of the apparatus.

The grid condenser has a value of 0.0005 mfd., and as attention is called to the extremely critical ohmage value of the grid leak, it would perhaps be advisable to use a variable leak in order to obtain the best results from this instrument.

For long-distance working, a Vernier type of rheostat should be employed.

Good Earth Essential.

In addition to the variometer tuning, a variable condenser of 0.005 mfd. capacity is connected between the aerial and earth and is inserted in the aerial and earth circuit between the point at which the grid connection is made to the aerial, and the lead which is taken from the earth terminal to the negative side of the high-tension battery.

The super crystal receiver described in "P.W." No. 38 is built by Mr. H. J. Redgewell, of 35, Monson Road, Redhill, Surrey.

THE THREE-SLIDE TUNING COIL.

Although practically unheard of by the greater number of amateurs over here, the three-slider coil is quite common in America. There are very few advantages over the more common type, the double-slider, but it should be interesting from an experimental point of view.

It is constructed in the same manner as any other slider coil, with the exception of the extra sliding contact and brass rod. The aerial and earth circuit is varied by means of the one-slider, as in the case of the two-slider coil. It differs from the double-slider in that the detector circuit may be varied by the other two sliders. The method of tuning is as follows: The aerial and earth circuit is first tuned to the incoming signals by means of the slider B. The secondary circuit is tuned to the primary circuit by allowing the slider C to remain near the end of the coil to which the lead-in is attached and moving slider A towards or away from slider C until the signals are at maximum volume.

Having thus tuned the secondary circuit to the primary circuit, by drawing both the sliders A and C towards the lower end of the coil a slight coupling effect can be obtained. This slight coupling effect is the only real advantage obtained with this type of coil over the other types. In obtaining this effect the turns of wire used in the aerial and secondary circuits would be at the ends of the coil, thus separating, to some extent, the primary from the secondary.

A variable condenser of 0.005 mfd. can, of course, be placed in series with the aerial to decrease the wave-length, while one in parallel, say, of 0.001 mfd. will increase the wave-length. The diagram shows a three-slide tuning coil used in conjunction with a crystal detector.
Listen in with an Efescaphone

No technical knowledge is needed
to get perfect reception on an "Efescaphone" 2 or 3-valve set.
It can be installed and operated by anyone who follows the
simple printed instructions supplied with each set.
It has a wave-length up to 4,000 metres, thus covering
Continental as well as English Broadcasting stations. The
2-valve set has a telephony range of fully 125 miles, and a
3-valve set 250 miles with headphones. The latter will
operate a loud speaker within a radius of approximately 75
miles of a broadcasting station, and at greater distance with
the addition of a note magnifier.
Finally, the appearance of "Efescaphone" Sets is all that
could be desired. The lay-out is neat and compact; the
presentation is all that could be desired. The lay-out is neat and compact; the
appearance is all that could be desired. The lay-out is neat and compact; the
cabinet work distinctive. In the set illustrated the
instrument panel is enclosed, when not in use, by a neat
roll shutter and the headphones accommodated in a
cupboard in the base. All connecting wires are out of the
way at the back of the cabinet.

THE "NELSON" (De Luxe Model)

PRICES:
complete with everything except valves
No. R. 90002, TWO - VALVE SET £25 : 0 : 0
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Type 600a. Capacities between 0.001 and
and 0.0006 mfd. . . . . . 3/6
*Supplied with or without grid leak clips as desired.

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Wireless Club Reports

The Editor will be pleased to publish concise reports of meetings of Wireless clubs and associations, provided the right to 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 with the Radio Society of Great Britain.

Treharris and District Radio and Scientific Society.
The above society has, since its inception, worked hard and is building itself in the practical and theoretical phases of wireless. It has on hand the construction of a crystal and valve receiver, and various experiments are carried out at the meetings, which are held bi-weekly—i.e. Tuesdays and Fridays at 6.30 P.M.
The society has on its programme some interesting lectures and demonstrations. The members are keen experimenters and are not purists in broadcasting. One of the members has been successful in receiving American broadcasting. Anyone desirous of joining can obtain any information from the Hon. Sec. at his residence.


The Carmarthen and District Radio Society.
A local wireless society has been formed, called the Carmarthen and District Radio Society, which is being affiliated with the Radio Society of Great Britain. At a recent meeting Col. E. C. Jones (3 O C) was appointed president, and Mr. W. B. Williams, vice-president.
Par help of membership can be obtained on application to the Hon. Sec., Mr. W. J. Thomas, 9, Hall Street, Carmarthen.

Battersea and District Radio Society.*
On Tuesday, July 30th, Mr. H. Bevan Swift, A.M.I.E.E., lectured to the above society on the "Fundamentals of Radio Work," which proved of great interest to the members.

His methods of cutting out unwanted stations was very interesting and solved the trouble of many members.

We have great pleasure in announcing that Captain Davis (2 X L) of the Pavilion, Lavender Hill, has kindly consented to become president of the society. He has offered the most valuable of the Pavilion Cinema for any special transmission.
Hon. Sec., A. E. P. Walters, 31, Holden Street, Grayshott Road, Lavender Hill, S.W. 11.

Tottenham Wireless Society.
On Wednesday, July 18th, Mr. R. G. Ellis gave a lecture on "Dual Amplification." After introducing the theory and method of this branch of research, Mr. Ellis gave details of several dual amplification circuits he had used. Hon. Sec., S. J. Glyde, 137, Wincheap Road, Bruce Grove, Tottenham, N. 17.

The Leeds and District Amateur Wireless Society.*
At an instructive meeting held recently the Hon. Sec., Mr. E. H. King, described "The Construction of a Two-Valve Portable Receiver." This self-contained set was on view, the first valve functioning as cumulative rectifier, magnetic retro-action being utilized for amplification, the second valve being a low-frequency magnifier, coupled to the rectifier by a transformer, normal valves and batteries being utilized. Practically every essential to maximum efficiency is included in the unit, the important items being the use of a micro-variorameter for fine aerial tuning, separate filament control, good potential adjustments, etc. The set was very successful last winter on the reception of U.S. broadcast and amateur traffic.

Hon. Sec., R. E. Pettigrew, 37, Auchinleck Avenue, Chapeltown Road, Leeds.

Barnet and District Radio Society.
Mr. F. W. Watson Baker presided at the fortnightly meeting of the society which was held on Wednesday evening, July 25th. There was a good muster of members, and amongst the new members enrolled was Mr. W. R. Kent, a member of the Barnet Urban District Council and formerly Postmaster of Barnet. He is the second local councillor to become a member of the Barnet and District Radio Society.

The experimental transmitting and receiving station belonging to Mr. W. Ionon, of 80, Barnham Road, Salisbury.

Catalogues Book Reviews Etc.

For those to whom money is an object P. J. Risdon, F.R.S.A., Research Editor of "Wireless Weekly," has written a very interesting little book entitled "Wireless Really Explained." Besides explaining the theory of wireless, there are interesting chapters on "Magnetism and Electricity," "How to Erect an Aerial," "How to Make a Crystal Receiver," etc. The twelve chapters are very interesting from end to end, while the book ends up with an explanation of the Morse code and a few interesting photographs.

It is generally stated that a repaired valve is not so efficient as a new one. To prove that this is not absolutely correct, Crowther and Osborne, Manchester, have forwarded us a repaired R type valve for test. While taking only very slightly more current than an un repaired valve, it gave really excellent results, and nearly quite equal to a new one.

This shows that it is worth while having your burnt-out valves repaired instead of paying a high price for a new one.

An interesting price list has been forwarded to us by the "Griffin Wireless Supplies Co." Besides giving a list of components and accessories, the catalogue contains details of complete one to four valve sets, and also an interesting unit set. All the apparatus of this well-known firm is well made and thoroughly efficient, despite the low prices of the goods.

There are many excellent variometers on the market at present, but perhaps none quite so neat as the new "Sterling" instrument. It is unique in design, while the novel construction of the rotor and station affords very close coupling and selective tuning. It has an inductance ratio of 9 to 1. The wave-length range is 250-2725 metres in conjunction with a 0005 variable condenser and when used with a standard P.M.G. aerial.

The Radio and Electrical Supply Co., of 29, Paternoster Row, E.C.1, are making a very unique offer and one that should appeal to all possessors of burnt-out valves. They are prepared for a time to accept burnt-out valves in part payment for brand-new valves of any of the Ediswan types. Somewhere around 4s. or 5s. is the usual burnt-out valve, so that amateurs can obtain the brand-new article for but half a guinea or so, against the usual 1Is.

The Mullard Radio Valve Co. have sent us one of their "bulk" valves for test. We have tried it and can safely say that it is one of the best valves we have tested irrespective of its merits as a small current consuming component. At 27s. 6d. it should command a very ready sale. On the "P.W." Combination Set, using a dry battery instead of the usually required accumulator, results were excellent. A single cell of an accumulator can be used, but we should think the length of time that it would last on the valve with the small required current would tend to cause amateurs to allow their accumulators to stand too long without charging.

Two leaflets have been issued by M. Hint & Co. They give details of a very neat set on the unit system, while a crystal receiver is also described. It should be mentioned that "Radiocite" has been obtained from this firm for some time, whilst it has often been difficult to get it elsewhere.
**The Marconi-Osram 'D.E.R.' Valve has now been reduced from £2 to 27s. 6d.**

Apart from its cheapness, the outstanding advantages of the 'D. E. R.' (the Valve which is fitted to the famous Marconiphone V2) are:

1. It consumes little more than half the current used by the ordinary Valve.
2. Its effective life is from 6 to 8 times longer.
3. It can be used with filament dry-batteries if desired.

The 'R'-type Valve has also been reduced from 17s. 6d. to 15s. 0d.

---

**The Marconiphone V2 is also cheaper.**

In consequence of the reduction in the price of the 'D. E. R.' Valves and of Telephones, the Marconiphone V2 is now sold at £2 2s. 0d. complete with Headphones, Valves, Batteries, etc.

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**Are you getting your 10% Bonus?**

Besides being able to purchase your Wireless Components at the cheapest prices in England, every customer participates in a bonus distribution of 2½% in the £. For instance, if your purchase amounts to £5 you are entitled to select quite free of charge additional components (of any description) to the value of 10%.

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If some form and endeavour to force a dilatory actions will have the minimum of delay can be exercised in before the anticipated winter boom and readers should communicate with their M.P.'s received daily from readers of POPULAR from one reader will be the limit for one letter.

Diversions are given pride of place when finally their cogitations are finished, and I, inclined to believe, however, that behind the last moment decided to leave it just a little longer. They appear to have been on the verge of breaking materialisation of the cheapest of German sense...
of jerks, according to the wave train, and this series causes a succession of clicks in the 'phones, which, coming very rapidly, produce a buzz or musical note, according to their frequency.

P.W.S. (Clacton)—In the details regarding the L.F. transformer for the "P.W." combination set, are not the dimensions incorrect in one or two places?

Yes, there are two misprints in connection with the choke bobbin. The 1 in. should refer to radius, not diameter, while the hole should be 5/8 in. instead of 1 in.

A.E.W. (Balham)—What is the cause of "Blue Glow" in a valve?

In the first place, when constructed, a valve is evacuated, and according to its degree of evacuation so it is called either "hard" or "soft." A hard valve is one in which there is little residual gas or air, while in a soft valve there is an appreciable amount of air.

When the filament of the valve is heated and a positive charge applied to the anode, or plate, electrons stream off from the filament and rush across to the plate. Now, if the valve has been fairly completely exhausted, the electrons will fly across without encountering many molecules of gas, but if there is residual gas present the electrons will keep on colliding with the molecules.

The molecules, on the other hand, have lost electrons, so that they are left with a positive charge. They are therefore called positive ions. Being positive they will not be attracted by the anode, but repelled; they will be attracted by the filament and will rush towards it.

On arriving at the filament the ions meet more electrons flying off and will eventually unite with some of these electrons, becoming neutral molecules once more. But they are now in amongst the crowd of electrons moving round the filament, and which naturally have a somewhat screening effect, because they will tend to repel some of the electrons leaving the filament.

The effect of utilising some of these electrons by the molecules, or rather ions, will "epe" this crowd, as it were, and thus remove its screening effect to some extent. The direct result of the is that more electrons rush off the filament to the plate.

All this action and interaction between the electrons and the molecules of gas means an expenditure of energy, which in turn is largely converted into heat. It is this heat that causes the "blue glow," for the molecules are heated up and the gas becomes incandescent.

A great drawback of soft valves is the fact that they are liable to have a much shorter life than those that are harder. This is because the filament is constantly bombarded by the positive ions, and thus is weakened and burns out more quickly.

If, therefore, you find that your valve begins to "blue glow," you must cut down your H.T. voltage so that the electron bombardment is lessened.

DUAMP (Kendal).—I have made up the Super-Crystal Set from "P.W." No. 38, and get some quite good Morse, but no telephony, being about 70 miles from Manchester. I did once get him fairly during the winter, so the set is quite O.K. I now wish to add a valve. Is it possible to make it into a dual amplification circuit without any switches, as in the "Combination" set? If so, what are the connections?

This is quite possible. As the A.T.I. of the crystal set will act as the anode coil in the dual amplification set, it will not be necessary for both the primary and the secondary coil to remain in the crystal set, so the first thing to do is to remove the secondary, taking the aerial terminal of the crystal set to the plate of the valve, and the earth terminal to the telephone and H.T. + , while the crystal is connected across the coil as in a single crystal set. The valve is connected as follows, the coils mentioned, of course, being for the broadcasting band of wave-lengths. The secondary of the super-cystal set can now act as the primary of the dual set, a new A.T.I. being constructed to form a loading coil if necessary. Take a lead from aerial to grid of valve, and connect plate to the aerial terminal of the crystal set.

(Continued on page 933.)

THE MOST FAMOUS PHONES IN THE WORLD.

The man whose livelihood—or even his life—depends on his ability to hear clearly distant signals pays serious attention to the choice and care of his headphones. We are proud of the fact that wireless telegraphists of all nationalities on land and on sea invariably select Brown A-type headphones.

Why? Because the famous moving reed mechanism, combined with its supersensitive aluminium diaphragm, picks up signals which are quite inaudible with ordinary headphones. And their superior construction, with the most minute attention to details, enable them to render a lifetime's service.

You, who use your headphones for pleasure should be guided by those who have the pick of the world's headphones to select from. They choose Brown phones and are satisfied.

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G. A. Ltd.
**RADIOTORIAL QUESTIONS AND ANSWERS.**

(Continued from page 927.)

L.P. transformer should soar to earth, while O.S. goes to H.T. and L.T. There is a transformer, which is connected to the secondary terminals of the crystal set. The filament resistance, of course, is connected in the usual manner between L.T. and filament. The earth terminal of crystal set goes to 'phones, the other side of that letter going to H.T. A fixed condenser of large capacity is connected across the H.T. and one of 001 mfd. approx. across the 'phones. One of 0001 variable mfd. may be necessary between A. and B. terminals of crystal set. The new A.T.I., then, the old secondary will be suitable for broadcast while both it and the anode coil (the old A.T.I.) can be loaded to reach higher wave-lengths.

L.W.C. (Manchester).—Is it possible to employ reaction on the “P.W.” Combination Set? In this event, could plug-in cells be utilised?

It is definitely possible to employ reaction in the Popular Wireless Combination Set, but this will not result in very greatly increased signal strength. Up to 50 mfd. of the effect of reaction is hardly noticeable if the set is used on an efficient aerial. It is much more in evidence if distant stations are listened to. It necessitates a form of reaction forbidden on 200-500 meter bands. However, it should be remembered that broadcast wave-lengths are much shorter.

Reaction is, of course, carried out by coupling the anode coil to the A.T.I. by the earth terminal and to the filament of the set. It is evident that transmission, and perhaps other listeners in if is not carefully handled. It is desirable to cut out the effect as far as possible and to use reaction the coil connections should be brought up to sockets on the surface of the panel so that either one or the other can be made and can be varied. Coupled to the remaining coil. If these alterations are carried out, it will be found that the wave-length will no longer be required, for the set was built in the above conditions and will not cause interference, however carefully it is handled. Apart from this, its operation makes it an ideal “household” receiver. Reaction will bring up the signal strength of weak stations, but it may be sufficiently disturbing if in first the set may become less stable and troubleshooting will be required.

If reaction is employed, we would advise you to keep the earth away from the L.T. and also to fit that type of crystal detector which carries a 1-Yolt rectifying screw for varying the pressure of the cat's whisker upon the crystal.

This latter—the pressure—is an important factor. It is used for the very light contact will cause violent oscillations and consequent howling to take place. Heavy pressure on the crystal will have an opposite effect, and will cut down the signal strength, so that it is important that the correct pressure be obtained.

CORRESPONDENCE

THE “P.W.” COMBINATION SET.

To the Editor, Popular Wireless.

Dear Sir,—In your letter of the 26th ult., regarding the Popular Wireless Combination Dual Amplification Circuit, our Technical Director, Mr. A. Chapman (who you will remember, is the inventor of the famous 3-Electrode Variable Condenser) has the opinion that this circuit would afford a very high degree of sensitivity, and enable long range reception to be effected with a minimum number of valves. Furthermore, the H.F. amplification circuit would carry a figure of the diagram would effect an appreciable degree of selectivity to the A.T.I. input, despite the fact of its being direct-coupled.

We trust that the above opinion, coming as it does from one who has been identified with wireless work since the earliest days, will prove of interest to your readers. Thanking you for giving us the opportunity of commenting on this very interesting circuit.

We are, dear sir,

Yours very truly,

Autoveyors, Ltd.

4, Victoria Street, Westminster, S.W. I.

CRYSTAL RECTIFICATION.

To the Editor, Popular Wireless.

Sir,—Will you kindly allow me to make a few comments on your “Notes on Crystal Rectification” appearing in the July 28th number of your journal, as this is a subject which is of some interest to me. I have a special study for the past fifteen years.

It is impossible to accept the theory of thermal action to explain the rectifying properties of the usual crystal detectors, for the three following reasons:

(1) When heat is applied to them they give no practical indication of thermo-electric action.

(2) If the most sensitive thermo-junction known—the platinum-bismuth couples used by Professor Thompson for measuring the heat of the stars, or the heat of a candle a mile away—are used in place of the usual detector, nothing can be heard in the telephone.

(3) Assuming a thermo-junction to act as a detector of feeble high-frequency oscillations, the resulting current from speech transmission would be quite inaudible in telephone receivers owing to the time lag of heat heating and cooling of the junction.

The statement that the resistance of a typical wire contact detector is 10,000 ohms is only half the truth, as all these detectors have a very high negative resistance. The positive resistance in the case of the cat’s whisker type averages 500 ohms, the current travelling from crystal to wire. On reversing the battery with negative to crystal the average resistance is 10,000 ohms.

In the case of zincite combinations the values are 750 ohms against 15,000 ohms or more.

The difference in resistance in the two directions fully explains the purely rectifying action that goes on. The greater the difference in the two resistances the more sensitive is the detector. It will be seen from the figures quoted that 95 per cent of the half wave is rectified, a figure that is not likely to be improved upon.

It is a simple matter to verify all this by measuring an adjusted detector on a Wheatstone bridge or placing it in series with a 1-volt cell and a milliammeter. The latter should register 2 milliamps. in one direction and 1 milliamp. when the detector is reversed. What is required for the functioning of all crystal detectors is high resistance at the point of contact.

When this high resistance is broken down by mechanical pressure, or the moving of the contacting electrodes to a position of no, or too low, resistance, then rectification becomes inefficient or ceases altogether.

During the past few weeks I have tested upwards of 100 pieces of a microammeter passing an average current of 200 microamps. from the rectified carrier wave of 2 L.O. and in only one instance was there a reversal of current—a matter of only 20 microamps., in the apparently wrong direction—and on investigation this was found to be due to the imperfect contact of the crystal in its holder causing partial rectification in two directions. Crystals must always be thoroughly embedded in “wood’s” metal.

Those interested in thermo-electric effects will be glad to know that a very efficient junction can be made for next to nothing by twisting together one end from each of a piece of copper and a piece of silver wire. The heat of the fingers applied to this junction will generate a current of 20 microamps., and the approach of a match will send it up to 200 microamps.

Although this is one of the most efficient thermal junctions I have encountered it is quite useless as a detector in a wireless receiving circuit. It could be arranged to give a deflection on a visual indicator when placed in a tuned circuit near a transmitter.—Yours faithfully,

B. S. T. WALLACE.

(Continued on page 940.)
APOLOGY
WIRELESS CRYSTAL
“TALITE”
Trade Mark

My attention having been drawn to the sale at my premises, 143-144, Fleet Street, E.C., of an article in substitution of, and represented as, the above-named Trade Mark, “Talite” Crystal, I HEREBY express my regret to HARDING, HOLLAND & FRY, LIMITED, of 27, Garlick Hill, E.C., the Sole Selling Agents for “TALITE,” for any inconvenience, loss or damage they may have sustained in consequence thereof, and undertake that no further sales of any substituted article shall be made.

DATED this 3rd day of August, 1923.
Signed R. GREEN,
143-144, Fleet Street,
London, E.C.

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ADJUSTABLE DIAPHRAGM,
LEATHER COVERED HEADBANDS, LIGHT WEIGHT
(11 OZS. ONLY)

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READY FOR USE.
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MOUNTED HANDSOME POLISHED
Cabinet 8" x 10" x 5 1/2"

PHONES
Coil Holders, Mounted Polished Ebonite, 2-way, 6/- each; 3-way, 8/-
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Fixed Condensers, all capacities
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Coil Plugs, 9d. each: Various Motors
Crystal Detectors, Glass-covered
Valve Holders, Highly Polished
Beaver Special Crystal

POST FREE.

THE BEAVER
ELECTRICAL SUPPLY CO.
(UNDER ENTIRELY NEW MANAGEMENT AND PROPRIETORSHIP)
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EVERYBODY

VARIABLE CONDENSERS
COMPLETELY ASSEMBLED WITH EBONITE
ENDS AS SHOWN IN SKETCH.

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NOTE:- Postage Charges 3/- per set, otherwise not executed.

To callers 1/- discount off condensers.

M. RAYMOND,
27, LISLE STREET, W.C.2

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NEW LAMPS FOR OLD
YOUR BURNT-OUT VALVE EXCHANGED FOR A NEW VALVE.
We will give you a new Ediswan or Mullard valve in exchange for
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Please send old for postage. Call if possible.
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THE "MYSTIC" AERIAL.
Will increase the Signal Strength of your Crystal Set or Increase the Range of your Valve Set
INCREDIBLE RESULTS ARE OBTAINED
HARD COPPER, 100 ft. . . . . . . . . . . . . . . 7/6
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Gloucester, August 3rd, 1923.
I consider the "Mystic" Aerial excellent and have obtained for the same a patent (No. 726). As my old aerial
is fitted with a big crystal detector, we had a 63 ft. high mast, a good test. I am struck by the increased
heritage of signals.
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TORDINODIUM WIRE

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Filament 3½ Volts. LIMITED NUMBER AVAILABLE. Send E.O. at once.
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VALVES REPAIRED ... / 6/- post free.
Our Method of Repair will Please You.

CORRESPONDENCE.
(Continued from page 998.)

A HUMAN AERIAL.
The Editor, Popular Wireless.
DEAR SIR,—During the past week I have been experimenting with various types of aerials, and have gotting quite good
results on a one-valve set, using quite primitive aerials. On July 19th I was
listening to 2 L O on a crystal set, using a normal outside aerial, and tried to get
results by using any body as an aerial. Wetting my fingers I pinched the aerial
terminal, and by increasing the inductance about 75 per cent. faint signals were
received from 2 L O. The music was clear, and by
straining my ears I could just manage to read or understand the announcing, etc.
I am seven miles from 2 L O, and my set is installed on the ground floor, thereby
obtaining no height. I would be pleased if you would publish this letter in your valuable paper.

Yours sincerely,
A. N. S.

Wimbledon Park.

DAMAGED BY LIGHTNING.
The Editor, Popular Wireless.
DEAR SIR,—With reference to your article re lightning a few weeks ago in Popular Wireless.
A friend of mine living near here was
acclimated to earth his aerial inside his house with a piece of 24 S.W. enamelled wire.
On the morning after the storm this wire was fused and the woodwork round the earth lead slightly scorched. Con siderable current must have passed to this aerial.
His aerial is mounted on two poles 12 ft. in length and mounted on the roof. The wire is about 3 ft. above the ridge, a total height
of about 50 ft. My own aerial is 30 ft. in height and 55 ft. long and is earthed by a switch, inside the window, having a separate direct lead into the earth plate. The ground is always damp. On the night of the storm I noticed for a short time a bluish glow about the mast head.
My aerial, etc., suffered no damage whatever.

Trusting these few particulars are what you require,—I am, yours faithfully,
W. H. Clarke.

TRADE MARKS AND WIRELESS.
The Editor, Popular Wireless.
DEAR SIR,—Re Trade Marks for sound-reproducing instruments, etc., is not possible.
I am seven miles from 2 L O, and my set was
listening to 2 L O on a crystal set, using a
AERIAL.

| Grant of the following patents can be opposed and printed copies of the full specifications obtained. |

198,552. — J. ROBINSON, H. L. CROWTHER, & W. H. DERRIMAN.—AERIALS. — For directional
transmissions, the power of the antenna is used, the idea being that radiations from
horizontal portions produce errors due to reflection in the upper atmosphere. Two
aerials having horizontal and vertical portions may be employed, the horizontal portion sending
upward, and the vertical portion being placed as far as possible apart, the aerial then being practically
H-shaped.

198,536. — W. KNIGHT.—INDUCTANCES.—Three flat circular coils are mounted upon ebonite stands, the centre
one of which is fixed, the others being attached to a rod passing through the fixed stand and to a concentric sleeve respectively. The staves are adjusted by means of screws on the ends of the rod. For the sleeve and the rod in opposite
directions.

198,636.—CAPITOL PHONOLIER CORP.—RECEIVERS. — A receiving set
is incorporated in an ornamental table lamp. The hollow base forms an inverted loud-speaker horn and capacity earth, and is fitted with a deflector. Umbrella and loop
aerials are formed in the top and sides of the shade which is divided for adjustment, and a
fringe conceals the valves, etc., placed at the centre, and also the lamps which are supported in reflectors around the sides.

198,662. — DR. G. SIEBT—CONDENSERS.—Condenser is
formed from metal coatings separated by very thin sheet mica. The metal coatings are
relatively movable, and at least one must be very thin. In one form, a thin bronze band presses a mica sheet against a vulcanite drum half sheathed in brass, the
capacity being varied by rotating the drum which may be paraffin lubricated.

198,700. — BRITISH THOMSON-HOUSON LTD.—VALVES. — The
valves for loud-speakers are arranged in a special manner, and are then sealed into the bulb so that the anode leading-in wire enters at the opposite end
to the grid lead-in. The valve is ultimately clipped into supports which engage the
leading-in wire.

198,757. — MARCONI'S WIRELESS TELEGRAPH CO., LTD.—VALVE
GENERATORS. — Short wave oscillations are generated by a two or three electrode val ve having spirally wound grid and filament, the grid leading to the H.T. positive and being separated from the filament lead by a
condenser. A negatively charged metal cylinder may surround the valve if only two electrodes are used, and the wave-length generated is adjusted by altering the length of the parallel leads.

R.F.
To produce a loud speaker which is worthy of the artists who nightly broadcast has been our ambition. A loud speaker which reproduces the fineness of the violin, the delicacy of the flute, the blare of the trombone and the characteristic quality of the voice, that has been our ambition and that is the guaranteed performance of

**TMC Loud-Speakers**

Obtain one from your usual stores, electrician or wireless dealer, and judge for yourself. We are confident your verdict will be:

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**SPECIFICATION.**

**Case.** Best hard Aluminum, solid drawn and accurately finished.

**Magnets.** Latest type horseshoe pattern of finest Yenstien Steel, resulting in strong and permanent magnetic force and receives careful attention.

**Core Pieces.** Finest quality of special soft iron, with fibre insulating sheets.

**Wire.** Each core piece wound with best enamelled high conductivity copper wire to 2,000 ohms by special machines.

**Diaphragms.** Made from selected hemp, perfectly flat, to conform perfectly with the core piece.

**Spacing Washers.** Special soft iron with fibre insulating sheets.

**Ear Gaps.** Of ample size, beautifully insulated and correctly proportioned.

**Insulation.** This is a particular feature and receives careful attention, finest materials only being used.

**Head Bands.** Made from best quality spring Steel, copper plated, oxide-dipped, and covered, giving beautiful finish.

**Testing.** Every earpiece is tested thoroughly during and after assembly.

**Guarantee.** We agree to return cash in full if not satisfied, and returned to us undamaged within 7 days.

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New Low Temperature
(Dull Emitter)
VALVE

PRICE REDUCED
from £2 to 27/6

Type
A.R.D.E.

Every care must be taken that not more than two volts are put across filament.

July 1st saw the reduction in price of our R. Valve from 17/6 to 15/-.

NOW we announce another enormous price reduction—our Dull Emitter Valve type A.R.D.E. previously costing £2 is reduced to only 27/6.

Improved methods of production, coupled with years of experience in Valve manufacture, make this wonderful offer of ours possible to-day.

Use this Valve under proper conditions and reliable perfection is the result. Simply see that only 2 volts are passed across the filament.

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If your usual Dealer cannot supply you send us a p.c. with his name and address.

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[Image of radio head telephones and valve]