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# Amateur Wireless

And Electrics

Every Thursday 3<sup>d</sup>

Vol. XI. No. 290

Saturday, Dec. 31, 1927



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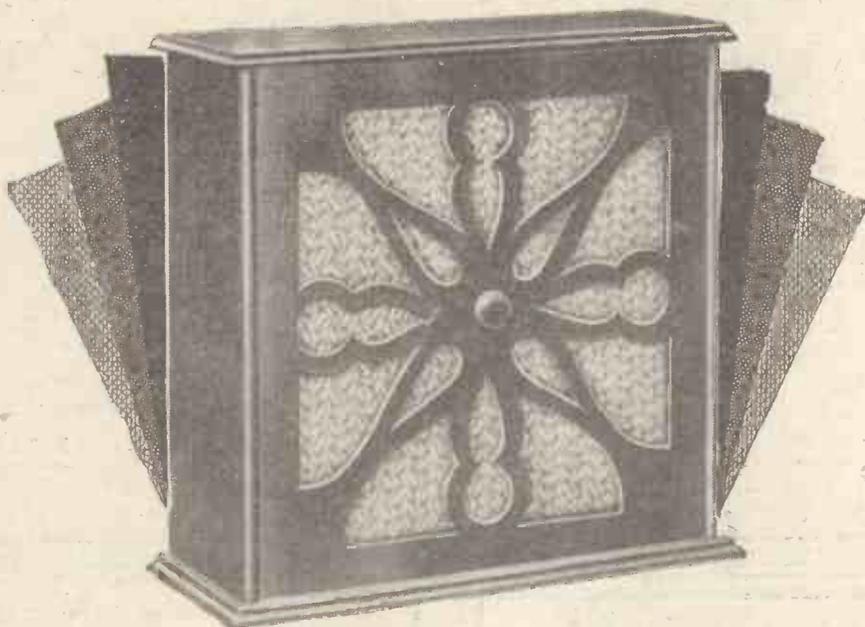
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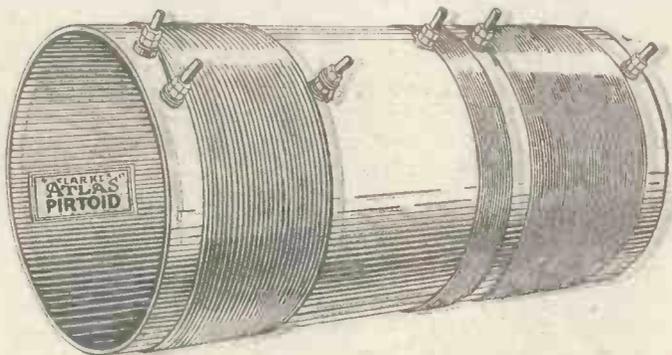
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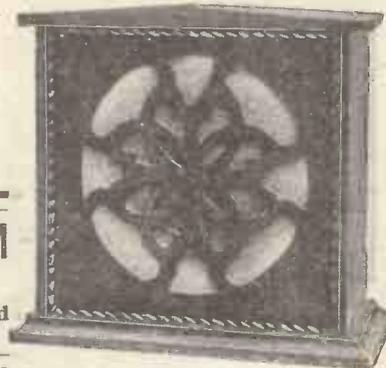
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# Amateur Wireless

and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Vol. XI. No. 290

Edited by BERNARD E. JONES  
 Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

December 31, 1927

**The "Short-wave Super-Six"—Closing Dec. 31!—An Electric Typewriter—  
 Theremin and Music—Exit the Spark—A "Three" and a "One"**

**The "Super-Six"**

DESTINED to set a new standard in amateur short-wave reception, the AMATEUR WIRELESS "Short-wave Super-Six" will make its bow to readers in the next issue of AMATEUR WIRELESS. It has been specially designed by Mr. J. Sieger, of the Amateur Wireless Technical Staff and full constructional details will be given. Although the controls are extremely simple—there is only one tuning adjustment—the sensitivity is such that even Australia can be brought in at full loud-speaker strength. We confidently anticipate that a large number of short-wave enthusiasts will be building the "Short-wave Super-Six," and a good supply of full-size blueprints has been prepared. The wiring is very simple, and the cost of the complete receiver is not excessive, in view of the really extraordinary results obtainable.

**Theremin and Future Music**

"THE advantage of the Theremin invention will not be that it will enable us to play our present scores without the present instruments, but that it will provide composers with a whole array of new instruments and new timbres and generate a new imagination and a new technique, and so lead in time to a new development in the art of music."—ERNEST NEWMAN in the *Sunday Times*.

**5SW**

5SW has recommenced transmitting, and is to be heard daily, excepting Saturdays and Sundays, between 1.30 and 2.30 p.m. and 7 p.m. and midnight, on its old wavelength, 24 metres. These transmissions are purely experimental and are being put out to find the best wavelength.



A number of little wooden boxes, perched on the top of posts at the entrances to all platforms at Liverpool Street Station, made a mysterious appearance during the night some time ago. They are the loud-speakers which broadcast the voice of a man, sitting in a signal-box, giving information regarding the departure of trains. Our picture was taken soon after the speakers had been erected.

**The Airman's Eyes**

WHEN the foggy season is with us, air pilots are more than ever thankful for radio D.F. stations. During the recent spells of fog an Imperial Airways liner was flown from Paris to London's air port, above the cloud bank and out of sight of land over the whole distance, in the normal time of 2 hours 26 minutes. Croydon's D.F. signals were the pilot's sole guide, although the 'plane was flying in perfect sunshine above the fog!

**Closing December 31!**

IF you are entering for our competition, don't "dilly-dally" too long, because all entries must reach us by December 31. We print the form for you to fill up on page 1020 for the last time.

**An Electric Typewriter!**

THE Teletype—as the "electric typewriter" is called—is (of course!) an American invention (it is made by the Standard Telephones and Cables, Ltd.). Actually it is a telegraph machine. The keys are depressed at one end of the line and the message is typed at the other! It is said to be very simple and inexpensive, and is, in fact, known as the Ford of printing telegraphs!

telegraphs!

**Exit the Spark!**

THE Post Office station at Grimsby, which has formerly caused trouble owing to local "spark" interference, is to be equipped with continuous-wave plant. This is the second move the P.O. is making to abolish spark transmitters at coastal stations. Seaforth changed over to C.W. some time ago.

**A "Three" and a "One"**

TWO sets that are both "a little different" are fully described in this number. The "Hartley D.X. Three," described on page 1008 employs Hartley reaction and R.C. and transformer "true-purity" coupling, thus achieving power, purity, and selectivity. On page 997 there is described one of the best one-valve sets that has been designed. The "Constant-coupled One."

**PRINCIPAL CONTENTS**

Current Topics ..	995	"Remedies" that Were not Cures ..	1005
1927—and the Future	996	The Dorchester Beam Station ..	1006
The Constant-coupled One	997	Without Fear or Favour	1007
The Real Art of Distance Getting ..	999	A Hartley D.X. Three	1008
The Berlin-Vienna Photo-telegraph Service ..	1030	Practical Odds and Ends	1012
On Your Wavelength ..	1003	"A.W." Tests of Apparatus ..	1016
		Our Information Bureau	1018

**The Editor Sincerely Wishes all his Readers a Bright and Prosperous New Year.**



# 1927-and the Future

## A RESUMÉ OF THE YEAR'S PROGRESS

### The Shielded-grid Valve

ONE of the outstanding features of the year has been the production of the shielded-grid type of valve. Although as yet, only in its initial stages of development, the possibility of using several stages of shielded-grid H.F. amplification, free from the complications of external balancing circuits, will go far to make selective long-distance reception a comparatively simple affair.



The known application of neutralising condensers to balance the effect of internal capacity coupling has its limitations, particularly in the case of a circuit intended both for long and short wave reception. The shielded-grid valve, on the other hand, ensures stability over a wide range of tuning without the necessity of making any change in adjustment when switching over from long- to short-wave reception.

Tuning under such circumstances can be reduced to the simple operation of a single-control dial, because all the high-frequency circuits can be perfectly matched and synchronized. In short, the design of ultra-selective sets comprising several stages of high-frequency amplification, suitable for operation by the unskilled listener, is an ideal that the new valve has definitely brought within reach.

### Abolishing the Accumulator

Another innovation that has come to stay, is the indirectly-heated type of valve. This solves the problem of the filament accumulator by abolishing it. During the last few months several new designs of indirectly-heated valve have been produced which are capable of operating both as high- and low-frequency amplifiers, so that long-range selective sets can now be equipped in this fashion.

The number of power valves in use is



much greater now than twelve months ago. It is largely due to their increasing popularity that the problem of the high-tension supply has grown so acute. The ordinary type of dry-cell unit, which gave satisfactory results so long as the output was of the order of 5 to 8 milliamps, will not stand up for any length of time to the doubled or even trebled output required by the modern power valve.

### Plate-voltage from the Mains

A wide range of eliminator units has therefore been designed to draw a steady plate-voltage direct from the electric-light mains. Where the domestic supply is direct current, the eliminator unit is comparatively simple and inexpensive to install. In most cases it gives complete satisfaction, though in certain localities the problem of cutting-out commutator noise presents undoubted difficulties. Also since D.C. eliminators are coupled directly to the outside power lines, the effect of external voltage variations due to other consumers on the same supply will sometimes cause trouble.

Alternating-current eliminators necessitate the use of rectifiers to convert the supply into a direct current. This increases their initial cost, though they can still be regarded as an economical proposition by comparison with the dry-cell unit when the cost is spread over a number of years. The fact that they are necessarily isolated from the power mains by a transformer serves to protect the set from outside disturbance and so removes this particular source of "noise."

### Home-chargers

Much of the inconvenience associated with the use of filament accumulators can be avoided by re-charging batteries at home. Amongst devices of this sort, there are interesting possibilities in the new metal rectifier used in the Ferranti trickle charger. The rectifier proper consists of a copper disc and a layer of

cuprous oxide, which is deposited upon the surface of the disc.

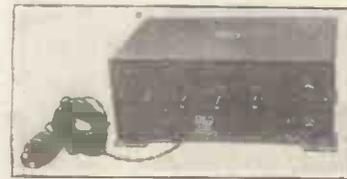
The combination forms an asymmetric couple, the effective resistance from the copper to the oxide coating being approximately a thousand times greater than from the oxide to the metal. The great advantage is that there is no valve to break or burn-out, or liquid to spill. In addition the dry-contact rectifier is compact in size and economical to install, whilst it will run indefinitely without costing anything for upkeep or renewal.

### Loud-speaker Progress

Loud-speaker development has also been influenced by the factors mentioned above. The use of power valves, together with convenient means for obtaining an adequate supply of working current from the mains, has tended to facilitate the more general use of the powerful moving-coil type of instrument. For those with a critical musical ear the performance of this type of speaker represents the nearest approach to perfection that has yet been attained.

Otherwise there has been a noticeable tendency to favour the cone type in preference to the horn speaker, which shows signs of disappearing from makers' lists. Type for type, the large diaphragm takes more energy from the set than the horn, and certainly gives a better response on the lower registers, though a well-designed horn is hard to beat on the higher notes and for voice reproduction in general.

For those who can afford it, an excellent combination consists in run-



ning a horn and disc loud-speaker simultaneously from the same set. A simple plug-in block can be arranged to throw the horn instrument in circuit for speech, the disc for organ or brass

(Concluded on page 998)

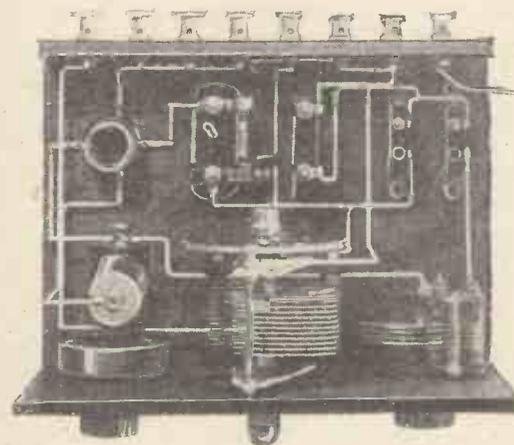
# THE CONSTANT-COUPLED ONE

IMPROVED CONTROL

ONE-VALVE enthusiasts will be interested in the "Constant-coupled One" described and illustrated in this article. Most readers are already familiar with the two usual forms of reaction known as magnetically-controlled and capacity-controlled reaction. The more popular of the two, amongst enlightened amateurs, is the Reinartz system, which is really capacity-controlled magnetic reaction. In the modified Reinartz system the reaction coil is constantly coupled to the tuning coil, variations of reaction being controlled by a variable reaction condenser.

### Improved Reaction

But how many Reinartz enthusiasts realise that by a very simple modification, vastly improved results can be obtained? Look at the circuit diagram shown here-with. Here we have all the essentials of the Reinartz reaction arrangement with one addition. The vital "extra" is a .003-microfarad fixed condenser inserted be-



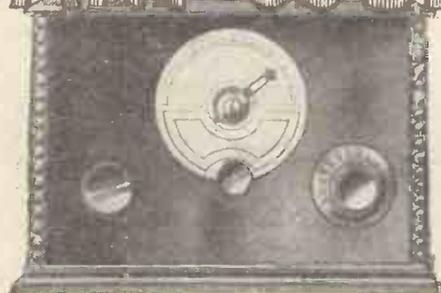
The Layout is Quite Straightforward

tween the lower end of the tuning coil and earth.

The theoretical considerations in connection with this form of reaction have been fully dealt with by Mr. J. H. Reyner in AMATEUR WIRELESS, in various articles. Briefly stated, the object of the circuit is to obtain a "stay-put" reaction control, so that, once set at the critical position, the reaction condenser can be ignored. The tuning condenser is then the only variable control, and the whole wavelength band can be covered without altering the reaction adjustment. In this way a highly sensitive arrangement can be adjusted to give maximum results on all wavelengths.

### Reaction Condenser

The .0001-microfarad variable condenser shown is not a reaction condenser in the



By the "A.W." Technical Staff

ordinary sense of the term. Its object is to adjust the proportion of capacity and magnetic couplings so that the reaction effect is constant over the whole wavelength band covered by the tuning coil and condenser. Once this simple adjustment has been effected, the listener can forget all about the reaction adjustment, although he will be reminded of the reaction effect as he travels round the dial!

The tuning coil is a Lissen No. 60X coil, tuned by a .0005-microfarad variable condenser. The constant coupling coil can be a No. 40 or No. 50 simple plug-in coil.

A .0003-microfarad fixed condenser and 2-megohm grid leak give the necessary rectification. To get a smooth reaction feed-back an H.F. choke is connected in series with the anode and one side of the phones. Note that the grid leak is connected between the grid and the filament side of the rheostat so that when the filament voltage is reduced so also is the positive bias on the grid.

### Components

Readers who would like to duplicate the "Constant-coupled One" will need the following parts. A full-size blueprint, price 1s. is obtainable from this office.

- Ebonite or Bakelite panel, 9 in. by 6 in. by 1/4 in. (Radion, Becol, Peto-Scott, Ebonart or Pertinax).
- .0005-microfarad variable condenser (Lamplugh, Jackson, Formo, Trix).
- .0001-microfarad reaction condenser (Cyldon, Peto-Scott, Bowyer-Lowe).
- One 30-ohm rheostat (G.E.C., Lissen, Igranic).
- Baseboard valve-holder (Lissen, Benjamin).
- .0003-microfarad fixed condenser with series clip (Dubilier, Lissen, T.C.C., Watmel).
- 2-megohm grid leak (Dubilier, Lissen, T.C.C., Watmel).
- .003-microfarad fixed condenser (Dubilier, Lissen, T.C.C., Watmel).
- Two baseboard single-coil mounts (Lotus, Lissen, London and Provincial Radio).

SIMPLE OPERATION

High-frequency choke (Trix, R.I. & Varley, Lissen, Watmel).

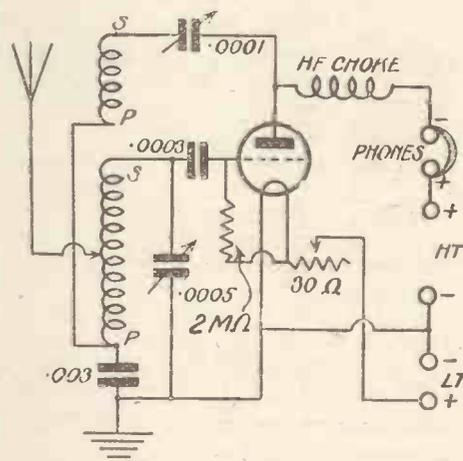
Terminal strip, 9 in. by 2 in. by 1/4 in.

Eight terminals marked: A, E, L.T.-, L.T.+, H.T.-, H.T.+, Phones+, Phones-, (Eelex, or Belling-Lee).

Connecting wire (Glazite or Juuit).

### Construction

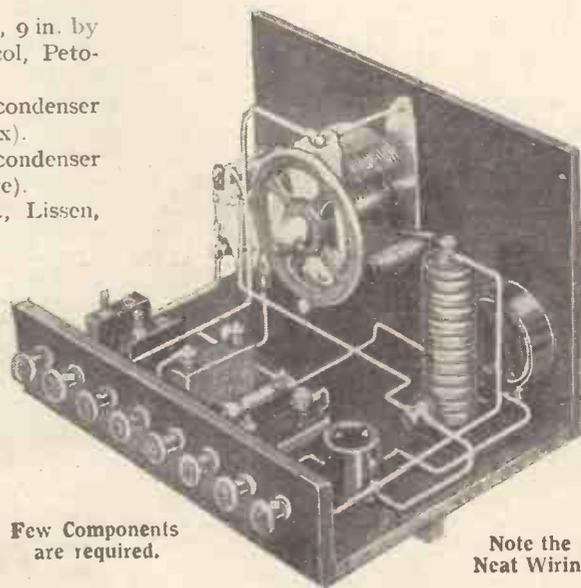
The receiver is built up with a 9 in. by 6 in. ebonite panel screwed at right angles to a 9 in. by 6 in. baseboard. A 9 in. by 2 in. terminal strip is screwed at the back of the baseboard and all the battery and phones and aerial earth terminals are mounted on



The Circuit Diagram

this strip in the order shown in the blueprint and its reduced reproduction shown here.

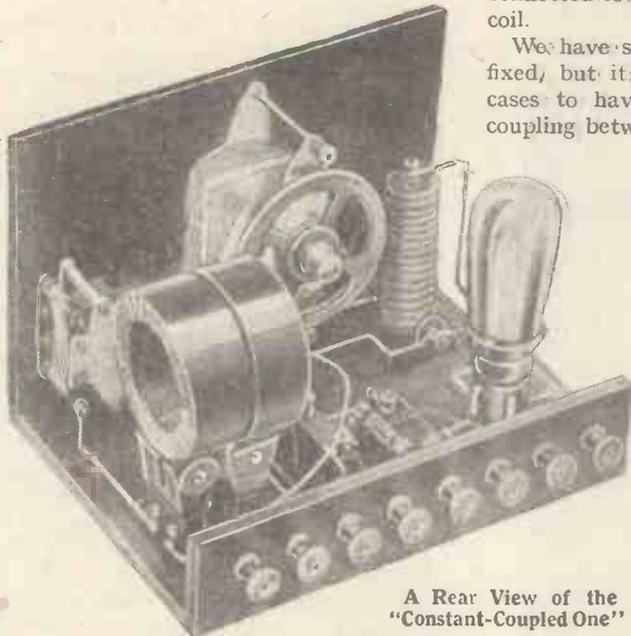
The panel is drilled to accommodate the .0005-microfarad condenser, the .0001-microfarad condenser and the 30-ohm rheostat.



Few Components are required.

Note the Neat Wiring

On the baseboard are the two single-coil mounts, one for the tuning coil and the other for the "constant-coupling" coil, the grid leak and condenser with an insulated clip for the "series" grid leak connec-



A Rear View of the "Constant-Coupled One"

tion, the valve-holder, the .003-microfarad fixed condenser and the H.F. choke. These components are screwed in the positions indicated and wired together as indicated in the blueprint. For clearness in photographing the receiver, we used white Glazite wire and this makes a very neat-looking interior. Junit wire can be used

with good results. Make quite sure that the wires to the two coil-holders are correctly followed as it is very important that the two coils are coupled in the correct way. The flex lead from the aerial terminal is connected to the "X" tapping of the 60X coil.

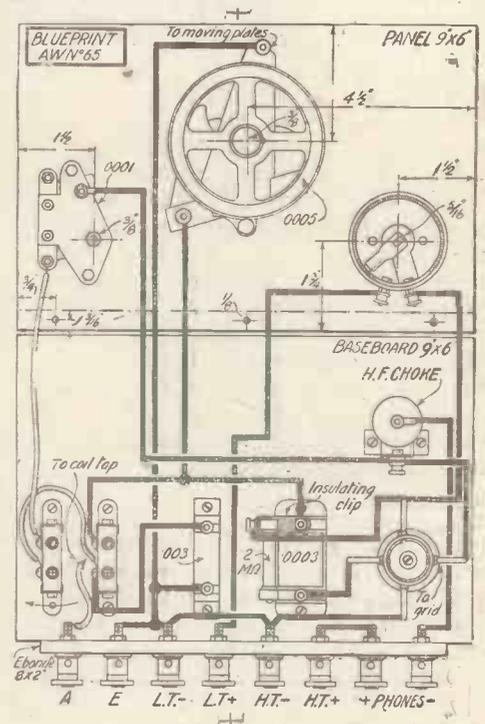
We have shown the single-coil mounts fixed, but it may be necessary in some cases to have one pivoted so that the coupling between the coils can be slightly "loosened" if this is found desirable.

**Operation**

To operate the receiver, set the tuning condenser at minimum and adjust the reaction condenser until the receiver is just below the oscillation point. Then rotate the tuning condenser and see if the reaction demand is the same all round the dial. If this state of affairs cannot be obtained, unscrew the coil-mount brackets and vary the coupling between the coils until the correct compensation is obtained.

In our tests a No. 40 reaction coil was used and a No. 60X coil for tuning. The valve was a Mullard PM1H.F. and this gave good results. Other suitable valves are, B.T.H. B21, Cosmos SP18/G, Cossor 210H.F., Ediswan H.F.210, Marconi DEL210, Osram DEL210, and SS210 H.F.

Readers who make the "Constant-coupled One" are invited to submit their expressions of opinion regarding it, although



The Wiring Diagram (Blueprint available price-1s.)

we would remind them that any queries relating to it are dealt with by the Information Bureau, provided the querist conforms with the rules set out on the Bureau page.

**"1927—and The Future"**

(Continued from page 996)

effects, and both in series for the ordinary range of orchestral music.

A word may also be said in favour of the electrostatic type of speaker, which at present is making great strides on the Continent. In shape it is very similar to the standard disc instrument, but is operated by the voltage variations set up across a choke coil inserted in the plate circuit of the last valve.

These are applied directly to a flat metal casting and set up dielectric stresses which in turn vibrate an extremely thin metal diaphragm forming the second plate of a condenser. The quality of reproduction is excellent, combining the advantages of the disc diaphragm with the sensitivity of the horn.

**Portable Sets**

During the present year there has been a noticeable advance in the design and performance of low-consumption valves in general. By thus simplifying the problem of filament current, the use of special multi-valve sets, such as the super-heterodyne, has been made a more feasible proposition. In particular it has resulted in the production of a wide range of really portable sets, which can be moved about without the aid

of a pantechnician, and are guaranteed to give satisfactory loud-speaker reproduction up to 25 miles on a small frame aerial incorporated in the set.

**Other Developments**

Looking outside the field of broadcasting proper, it is significant to note the outstanding success of the beam method of signalling. During the last quarter of the year the Imperial chain of Beam stations was completed by the opening of the new service to India. Further extensions are at present under consideration, and it is likely that beam signalling will displace all others for long-distance working.

Television is still eagerly awaited by the listening public, but in spite of many optimistic promises, the establishment of a television service, and the provision of inexpensive receiving apparatus suitable for home use, appears to be as far away as ever.

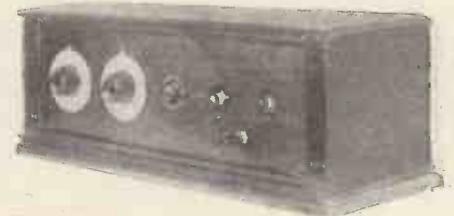
M. A. L.

The quality of the transmissions broadcast by the PTT transmitters at Rennes, Lille and Marseilles recently has been so poor that local wireless associations have appealed to the French Ministry to close down the stations until they can be improved. In Rennes, listeners have obtained two days' silence, weekly.

**THE "SHORT-WAVE SUPER-SIX"**

**NEXT WEEK'S SPECIAL FEATURE**

This is a view of a wonderfully efficient six-valve receiver which is to be fully illustrated and described in next week's issue of AMATEUR WIRELESS. Designed, built, and tested by Mr. J. Sieger, the "Short-wave Super-Six," will receive anything on earth which is being transmitted on the short waves below 150 metres. The



preliminary tests have yielded extraordinary results—Sydney, Australia, on the loud-speaker is but an example of its powers. Tuning is controlled by a single tuning condenser, the only other variables being a potentiometer and a reaction condenser. We are confident that the "Short-wave Super-Six" will set a new standard in short-wave reception.

# The Real Art of Distance Getting

By J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

**D**ISTANT reception, or D.X. as it is often termed, is not altogether a simple matter. Certainly the number of continental stations operating on a fairly high power to-day, has made it possible to receive a number of programmes with a fair amount of ease, but this can hardly be considered as coming within the category of real D.X. work. The reception of a station many hundreds of miles away on any evening when conditions are not too good is the real test of one's receiver.

It is under such adverse conditions that the real joy is experienced in satisfactorily obtaining the definite indication that one requires concerning the particular station, so that there can be no doubt in one's own mind, at any rate, as to the identity of the station in question.

## Practice Necessary

Now, some sort of definite training or practice is necessary to obtain results under real D.X. conditions. It requires a highly developed faculty of concentration in order that the signal required can be sorted out from the welter of mush, atmospherics, back-wash and such like. One may hear a snatch of telephony, but in order to work it up to its proper strength, it is necessary to be able to understand what is happening, to a small extent at any rate. One must concentrate on the telephony to the exclusion of the various other conflicting sounds and then, by careful tuning, work up the station so that it becomes definitely stronger than the interference, when it will lift itself clear, as it were.

The difference between the experienced hand and a novice is that the former can, by utilising this faculty of concentration, find and tune in many more stations than the novice on the same receiver under exactly the same conditions. This effect, in a way, makes the practice of giving test reports somewhat dangerous, particularly in the case of a receiver which is capable of very long range in proper hands. The designer of the receiver, having spent some time in evolving the circuit, has got used to its idiosyncrasies and this, coupled with the fact that he is essentially an expert and thus has this faculty of concentration in listening well developed, enables him to obtain probably a large number of stations at good strength on his particular receiver.

## Calibration

From the stations already obtained one has some idea of the wavelength calibration of the receiver, from which it may be evident that there are blank spaces on the dial representing wavelengths on which stations are known to be working. The receiver is keyed up to the pitch of sensi-

tivity and the dials tuned in round about this mark. At first, probably, there is simply a dreadful mush, unless the night happens to be exceptionally good, yet at the back of all this we know there is the station. Can we tune it in?

## An Interesting Experience

I can remember some years ago when I was in the Post Office Radio Department, I used to spend some time in improving the reception conditions at the long-distance ship and shore stations at Devizes. Here the signals were very weak, the transmitters being usually about  $1\frac{1}{2}$  kilowatts in power and the range 1,000 to 1,500 miles, while there was always interference from nearby stations working on similar wavelengths. The operators there were an absolute object lesson in this faculty for concentration. They would listen to a station and "copy" matter with two other stations, both of them stronger than the one under consideration, interfering all the time.

On one occasion I had a special gadget which I wanted to introduce on some definite weak signal in order to see whether it would improve the reception. Before very long an opportunity arose, for the operator "got a bite," tuned in the station and proceeded to take down the message. The ship was a good distance out in the Atlantic and it would have been a splendid opportunity to try the new gadget, if I had been able to hear the station. But I could not! The mush and interference completely drowned the station to my relatively unpractised perception and yet the operator not only heard, but was able to concentrate to such effect that he was obtaining practically "clean" copy.

To take another simple instance, we can consider the reception of one station very close in wavelength, to a local transmission. The receiver may be capable of separating the two if the distant station can be obtained

first of all, but it is finding the station in the first place that constitutes the problem. It may be necessary to wait until the local station ceases modulating for a moment, when the distant station may perhaps just be heard in the background, the receiver of course being approximately tuned to the required position. This is the opportunity and during that fraction of time before the local station recommences its programme, it is necessary to seize mentally upon the distant programme and concentrate on it to the exclusion of the local programme, when it commences once again. It is only by doing this that the station can be worked up sufficiently to get it clear of the local station. This result will be obtained when the carrier of the distant transmission has been worked up to greater strength than that of the local station, and it is during the working-up process that concentration is necessary.

The problem of course is rendered much more difficult if the programmes from two stations are similar in character, for it is then intensely difficult to concentrate on the one required. Of course a highly selective receiver having four tuned circuits or more,

(Concluded on page 1000)



WIRELESS AT LONDON'S NEW AIR PORT

The wireless "mystery" tower at the new Croydon air port. Three operators will be on duty day and night and will have control over air expresses flying hundreds of miles distant.

# THE OFFICIAL BERLIN-VIENNA PHOTO-TELEGRAPHIC SERVICE } History in the Making

By DR. ALFRED GRADENWITZ

THE official photo-telegraphic service between Berlin and Vienna was, on December 1, opened at the Berlin Main Telegraph Office in the presence of Prof. Karolus, inventor of the new system, and Count Arco, director of the Telefunken Co., who co-operated with the former in developing it to its present state of perfec-

Photo-telegrams as officially accepted for transmission between Berlin and Vienna comprise any photographs, positive or negative, film bands, drawings, plans; printed matter, samples of writing, documents, shorthand records, etc.

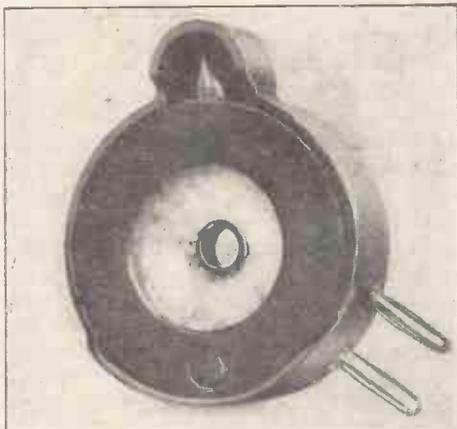
### Regulations

Photo-telegrams, by this system, must not exceed the size of 10 cm. by 19 cm., viz., the area available on the cylinder of the transmitter; larger pictures have to be sub-divided into several sections. The minimum fee charged for the transmission of photo-telegrams is the amount for an area of 10 cm. by 4 cm., which is eight marks, two marks being charged for each additional centimetre. The cost of urgent photo-telegrams is three times this rate. A reduction of 20 per cent. is, however, made after business hours, i.e., between 9 p.m. and 8 a.m.

Black print, black writing or drawing on a white background is rendered most

first instance used a selenium cell. However, just as Korn himself eventually discarded these rather inert cells, Prof. Karolus, working in conjunction with the Telefunken people and the German Postal Department, adopted photo-electric cells.

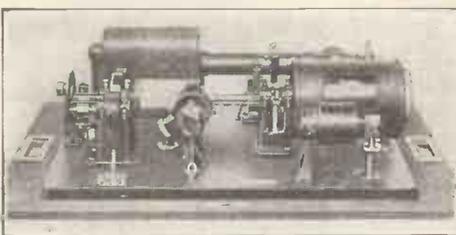
The picture is wrapped round a rotating (and slowly advancing) cylinder, and is



The Karolus Photo-electric Cell

tion. A party of officials and press representatives attended the ceremony.

Secretary of State Feyerabend, of the German Postal Department, welcomed those present and in a short inaugural speech, emphasized the importance of the new service. While he was thus speaking, and a similar ceremony was going on at the other end, a portrait of Chancellor Dr. Marx, together with some words of congratulation, was transmitted from Berlin to Vienna. In a similar manner, a portrait of Dr. Seipel, Austrian Federal Chancellor, was transmitted from Vienna to Berlin. The key-note of all speeches and congratulatory messages was a wish that the new service should prove instrumental in promoting the friendship and mutual understanding of nations.



The Photo-telegraphic Transmitter

clearly. Yellow, blue and violet are colours not desirable, nor can any satisfactory reproductions of dim or blurred pictures be expected.

Photo-telegraphy, of course, consists of a conversion of visual picture-elements into a succession of electric current impulses. The fundamental principle underlying all modern methods of photo-telegraphy was first suggested by Prof. Korn, who in the



Reproductions of Transmitted Matter

explored by a brilliant spot of light occupying an area of 1/25th of a square millimetre, the varying intensities of light falling on the light-sensitive cell and thus setting up electric impulses. At the receiving end these current impulses are, by means of a particular cell devised by Prof. Karolus, re-converted into light of varying intensity which falls upon a photographic paper. The remaining process, of course, is purely photographic.

After the first official exchanges of photo-telegrams, the regular public service was started and a large number of pictures were on the first day transmitted from Berlin to Vienna and vice versa. A few minutes is the time so far allowed for each transmission.

## CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**
- Jan. 1 Military Band concert. Religious service relayed from Holy Trinity Church, Folkestone, conducted by Canon W. H. Elliott.
  - " 2 Chamber music.
  - " 4 *The Merry Wives of Windsor*, a comic opera in three acts by Nicolai.
  - " 5 Royal Philharmonic Society concert, relayed from the Queen's Hall.
  - " 6 Song recital.
- DAVENTRY (5GB)**
- Jan. 1 Religious service, Conducted by the Lord Bishop of Birmingham, the Right Rev. Ernest William Barnes, M.A. *Dido and Aeneas*, an opera by Henry Purcell, from Birmingham.
  - " 2 Ballad concert.
  - " 3 Military Band concert.
  - " 5 *Heart's Desire*, a comic opera *en casserole*, by Mabel Constanduros, from Birmingham.
  - " 7 Old favourites, from Birmingham.

- CARDIFF**
- Jan. 1 *The Spectre's Bride*, a cantata by Dvorak.
  - " 2 *First Footing*, a New Year's revue.
  - " 6 Memories of Theatreland.—7, The Palace Theatre.
  - " 7 Dancing round the world
- MANCHESTER**
- Jan. 2 *The Two Elizabeths*, a play by Netta Syrett.
- NEWCASTLE**
- Jan. 6 *Glimpses of the Past*, a series of historical episodes.
  - " 7 The Marsden Colliery Prize Band.
- GLASGOW**
- Jan. 2 A Grand Pantoradiotime.
  - " 3 A Scots programme.
- ABERDEEN**
- Jan. 3 *Memories of 1927*, presented by the Radio Concert Party.
- BELFAST**
- Jan. 2 Our Pantomime.
  - " 9 A Novel Game of Chess.

## "The Real Art of Distance-getting"

(Continued from page 999)

would be able to tune out the local station completely and receive the distant station without any trace of interference even during the initial period, but this is rather a different problem, and has other difficulties associated with it.

Practice is the only method of acquiring this concentration. If you want to become a real D.X. expert you must set yourself to tune in stations a little beyond your normal reach. Do not be discouraged if you fail quite a number of times. In the end you will succeed and your labour will be repaid a hundredfold by the pleasure which results.

# Station after Station

As easy  
as setting  
the hands of a clock



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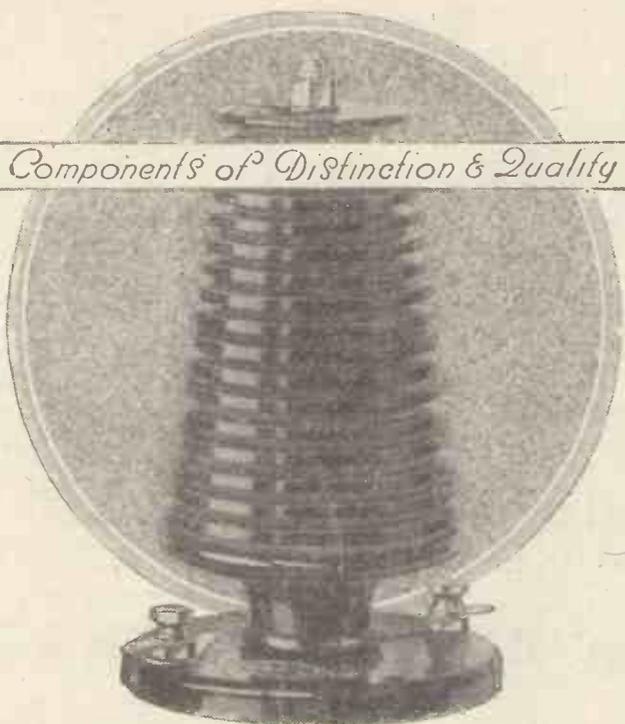
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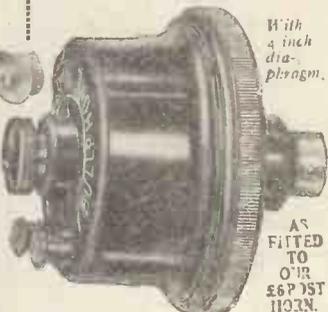
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# On Your Wavelength!

## Asking For It?

FOR some little time now the B.B.C. has bemoaned a steady increase in the howling nuisance. My own private view is that such an increase may not be unconnected with the publication, more than once repeated, of the circuit diagrams of the B.B.C. exhibition sets. If you examine these with a little care you will find that both the two-valver and the three-valver incorporate magnetic reaction directly coupled to the aerial coil. I don't know about you, but I regard a set of this kind as about the hardest thing there is to tune successfully without doing a bit of squealing. When I raised the question with a B.B.C. man some time ago he gave me a delightful reply. The sets, he said, were intended only for short- and medium-range quality reception, and it had been clearly stated in print that they were not designed for reaching out. So long, he told me, as the user confined himself to local or semi-local stations, and did not exceed the ranges laid down for his particular set, he could get all the strength he wanted without using too much reaction, and would therefore have no temptation to oscillate. I heartily agreed, but the "ifs" are rather big ones, don't you think?

## Who Can Resist?

My own experience is that anyone who has a wireless set capable of bringing in two stations immediately wants to get a third with it, and then a fourth, and then a fifth, and so on to the "nth." Just about the last kind of receiver that I would put into the hands of a boy or enthusiastic beginner is one of these swinging-coil plain aerial affairs. Yet the B.B.C. scatters these circuits abroad, stamps them with its official seal, tells us that they are the goods—and then becomes worried over an increase in the matter of catcalls, chirps, squeaks, yells, howls, and moans that in some localities accompany its transmissions. Circuits such as these could not be tolerated for a moment in America.

## Steel and Wireless

Details of one or two matters of special interest to amateurs have been published in the daily press within the last week or so. Wireless and steel is a combination which cannot fail to attract the attention. Many readers are familiar with the heating properties of radio frequency currents, especially those who use hot wire ammeters in connection with high-frequency circuits. In this instrument the heat generated by the current passing over a wire of limited surface area causes the wire to sag and the needle on the front of the instrument shows a deflection. The same principle applies to

the high-frequency crucible furnace which has recently been demonstrated in Sheffield.

## Interference

It makes one anxious as to what chance broadcast will have in the neighbourhood of a foundry employing this method. Of course ordinary electric furnaces cause quite an amount of disturbance but the use of a radio-frequency furnace is too bad to contemplate. Even the heavy-handed oscillator will be tame in comparison to the noise which will find its way into the loud-speaker. Incidentally will it be necessary for the steel founder to have a wireless licence in order to operate this type of gear?

## And now, France!

The news that France has at last decided to carry out its original plan of erecting eighteen broadcasting stations does not allow me to contemplate the future with equanimity. The Committee of French Finances evidently has its eye on a possible revenue from listeners to both home and foreign transmissions, and in the hope of "regularising the situation," as the Paris press terms it, it has decided to promote most of the schemes already submitted by the Ministry of Posts and Telegraphs. Up to the present, French wireless fans—who cared to do so, there appears to have been no compulsion—have contributed to the State the very small sum of 1 franc, or 2d., as a registration fee for their receiving sets!

## Increased Fees!

To-day, the State considers that a larger payment should be made to support the development of broadcast telephony, and it suggests that the annual tax be fixed at 5 francs for a crystal set and 10 francs per valve, in a valve set, a fee which in no way can be considered exorbitant. Apart from this tax directly paid by the listener, it is proposed to collect from the manufacturer or importer, an *ad valorem* fiscal duty of 5 per cent, on all valves.

## A Lead

In the meantime, *Radio Paris*, taking the lead, has prepared the equipment of its high-power station and within a few weeks or so hopes to transmit on 50 kilowatts!

In response to a threat by the authorities to close down private transmitters, the *Petit Parisien* is considering the removal of its transmitter to a site outside the French capital, although I am of the opinion that for obvious reasons a newspaper-owned broadcaster may escape the wrath of the French Ministry of Posts and Telegraphs. The sites of the new regional stations are Nice, Beziers, Montauban, Agen, Clermont, Ferrand, Lyon, Dijon,

Angers, Nancy, Ajaccio (Corsica) and a "super" at Paris.

## A New Broadcaster

A continental correspondent informs me that during the last week or so, he has twice picked up transmissions from what would appear to be the new Bucharest broadcaster. So far as I have been able to ascertain the test transmissions have been made in the near neighbourhood of 1,600 metres—a wavelength, which I trust will not be a definite one. For the present, the broadcasts consist of the usual gramophone records so beloved by wireless engineers, although now and again, for experimental purposes, vocal items have been transmitted. My correspondent informs me that on no occasion could he pick up a definite call, but that from a few sentences heard, he was convinced the language was Rumanian. Here is a chance for the D.X. searchers to display their activities.

## Live and Let Live

If there is one region where there is no overcrowding it is on the wavelengths below 100 metres. Allowing for a 10-kilo-cycle separation, there is room literally for thousands of stations down there, though comparatively few are to be found working at any given time.

Since there is, so much elbow-room, I cannot see why amateur and commercial transmitters should so often make use of the wavelengths of well-known short-wave broadcasting stations at times when these are sending out programmes. During PCJJ's twenty-four hour test he was badly jammed for some time by a tonic train transmitter, and I have frequently found jamming by either T.T. or C.W. when I have tried to tune in KDKA, 2XAF, or 2XAD.

A few nights ago an amateur sending C.W. was right on top of 2XAF, and remained there for a long time. Yet on turning my condensers to see whether he was adopting this wavelength because he could not help it owing to overcrowding, I was surprised to find that there was no other transmission to be heard within three or four metres above or below 2XAF; and three or four metres on these low wavelengths mean a very great deal, as short-wave enthusiasts will realise.

## Morse Again!

Friends living on certain parts of the coast tell me that 5GB is of absolutely no use to them owing to morse interference. In many places, in fact, the only B.B.C. station that can be well received is 5XX. It seems to me that morse interference, unless something is done to check it, is

## On Your Wavelength! (continued)

going to spoil the success of any broadcasting scheme by preventing an A1 service from being given in coastwise places. So far as I can make out, the bulk of the trouble is not caused by ships, but by stations on the coast which seem to think that they can use whatever wavelength they like without let or hindrance. By far the worst offender on the broadcast band is FFB, the Boulogne station, whose tuning is incredibly flat. In some places he can be heard—or, rather, cannot be got rid of—over a great part of the broadcast band. One friend living near Brighton actually assures me, with his fingers crossed and his hand on his heart, that FFB interferes with his short-wave reception! Even 5XX has not been free at times from morse interference, for, as I noted recently, trouble from a C.W. signal has been experienced in some parts.

### More Trouble

I acquired recently a couple of very expensive fixed condensers which are so beautifully made that they are a sheer joy to look upon. With each of them came a queer little template with full instructions about the way to use it for drilling the holes required for the fixing screws. Now, if templates are of tin or brass or zinc I like them very much, since they enormously ease one's labours in such circumstances. But paper templates, my friends, are inventions of the evil one. It would not be so bad if holes were punched in them, for one would then have a chance of making the holes with reasonable accuracy.

### A Better System Wanted

When the centres are indicated merely by rather coarse cross lines you have every chance of making an error in your marking out sufficient to cause two out of the three fixing screws to decline firmly to be driven home. Though I say it myself, I am pretty good at accurate marking out and drilling. I used my first template as carefully as I knew how and made the required holes. Not one of the screws would go in properly. However, by discreet use of the rat-tailed file, I managed to get them in somehow. With the second condenser, thought I, I will not use the template, but will measure very carefully the distances between the centres, and then mark out with super-accuracy. Unfortunately, these centres seemed to have been laid out by somebody using a ruler marked off in cubits or versts, or something of that kind. Certainly the distances came to no reasonable fractions of either inches or centimetres. Finally, in despair, I drilled and tapped fresh screw-holes of my own in the end-plate.

### Only a Rumour?

I have heard a report lately that we are

shortly to be startled by something absolutely new in the way of accumulators. One has so often heard statements of this kind in the past, which never came to anything, that one accepts them with the proverbial grain of salt. In this particular case the inventor is stated to be a Spanish priest who has turned out a secondary battery which makes use of no acid or alkaline electrolyte. It can stand indefinitely, either charged or discharged, and even a direct short-circuit has no effect whatever upon it. It is rumoured that successful tests have been made in both France and Germany, and that manufacture on a large scale is to start at no very distant date. Has any reader heard anything about this accumulator? If he has, I am sure that wireless enthusiasts, including your THERMION, will be very grateful for any definite information about it.

### A Good Partnership

In the very early days of broadcasting, there was a rather widely held belief that wireless might seriously injure the gramophone trade. This was never my view and I have said more than once in AMATEUR WIRELESS that the wireless set and the gramophone were partners instead of foes. That this opinion was correct is shown by the fact that the gramophone trade has never been in so flourishing a condition as it is to-day and there is an enormous demand for records of songs and musical pieces that have been broadcast. And now there is another aspect to the partnership. The pick-up device is becoming very popular with wireless enthusiasts, large numbers of whom now reproduce their records through the medium of the low-frequency part of the set and the loud-speaker.

### The Modern Gramophone

A good pick-up device is a sheer joy to use, for needle scratch is much less, and with a proper L.F. amplifier and loud-speaker one obtains reproduction of splendid quality and at any desired volume within the capabilities of the output valve. I expect that before long we shall have big cabinet sets incorporating both the wireless set proper and the gramophone with the pick-up device. With such apparatus one is naturally independent of ether conditions, or of broadcast programmes that do not appeal. Entertainment is thus ensured at any time either by wireless or by gramophone.

### Another Big 'Un

When my faithful old accumulator developed senile decay at the end of the summer I invested in a beautiful new one in a glittering glass case. My passion for big batteries does not confine itself to H.T.B.s. for I must confess that I like

large accumulators, too—except when it comes to taking them to the charging station for a refill. My own glass-cased accumulator is of the 80 actual ampere-hour variety, and the current drawn from it is usually between .3 and .4 ampere. At the latter figure it gives 200 hours—or, say, ten weeks'—service. Charging costs half a crown, so that my filament current works out at threepence a week. Last, but by no means least in the way of advantages, I need only lug it to the charging station five times a year.

### Don't Take Risks

I had meant before to refer to the needless risks that people often take with electrical apparatus. This year there have been quite a number of accidents, several of them fatal, due to neglect or some small fault in electric-light wiring. If there is a defect, however small it may be, in a switch, an electric-light fitting, a wall plug, or anything of the kind in your house don't hesitate but have it rectified without delay.

### Special Care

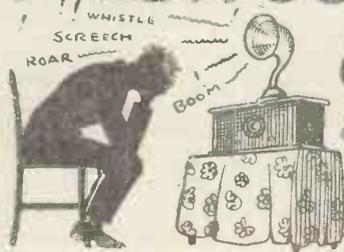
The greatest danger is in rooms whose floors either are made of conducting matter or are often wet, such as those of bathrooms, sculleries and so on. If you happen to be standing on such a floor with your bare feet, there is a ready path to earth through your body, especially if the skin is wet. In such circumstances a small current leakage may inflict a fatal shock if a defective electric component is touched. There is also, as I have mentioned before, a certain amount of risk in running extension wires for a loud-speaker straight from the output terminals of the set with no intervening transformer or filter circuit.

### Working off the Gas Mains

Time was when those who had not electric light in their houses were wont to bemoan the fate which compelled them to carry large and heavy accumulators to and from the charging station, usually some little distance away. "If only we could charge at home!" they used to sigh. They envied their more fortunate friends who either used valves that could be worked by means of a transformer from the A.C. mains or fitted trickle chargers which put back during the night all that had been taken from the accumulator during reception hours. To-day you can run your filaments off the gas mains and scrap accumulators altogether! There is now on the market a neat little device which supplies low-tension current through the agency of a large number of thermo-junctions. To make it deliver "juice," all that you have to do is to light up the gas-burner in its interior and the heat so supplied does the rest.

THERMION.

# Remedies That Were Not Cures



By R. W. HALLOWS

"DO you know," said Bradlow, as we sat chatting in his den the other evening, "it's rather a queer thing, but I have just made up a receiving set incorporating all the things that ought to make for perfectly pure reception, and I am not a bit satisfied with its performances. They say that for good quality you ought to have an anode-bend rectifier; I've got an anode-bend rectifier. You should use resistance-capacity coupling for your note-mag valves; I've used it. You should have a super-power valve in the last stage; I have a super-power valve and I give it all the plate volts that the makers will allow and grid bias it properly. Then I've heard that if you want really to hear the bass notes you certainly ought to have a cone-type loud-speaker, which is just what I'm using.

You will see that I've made use of all the recognized producers of good quality, but I'm most disappointed with the results. Just listen to it now and tell me what you think of it candidly."

He went over to the table and switched on the set which promptly began to reproduce 2LO's programme. It was not pleasant reproduction by any manner of means. When the orchestra was playing you heard some sort of bass right enough, but you heard very little else. Speech was distinctly of the half-swallowed-potato variety, whilst distinct signs of overloading of some kind were to be observed in the somewhat queer noises produced at intervals.

"Well; what do you think of it?" said Bradlow, switching off at the end of ten minutes or so.

"I am afraid I can't congratulate you on the purity," I replied. "There certainly is a great deal wanting and it's obvious that there's something very much wrong with the thing. Have you a circuit diagram?"

Bradlow went over to his desk and after rummaging about amongst his papers produced the diagram which is shown on this page. I learnt that the first and second valves were medium-impedance valves of the ordinary "H.F. and detector" type. The third was a high-impedance valve

intended for resistance-coupling and V<sub>4</sub> was, as he had previously said, a low-impedance super-power valve.

"Nothingstrikes me at once," I remarked after inspecting the diagram and obtaining these valve details.

"What's that?" queried my friend with a look of surprise.

"Well, just look at what you've done with the loud-speaker."

"But the loud-speaker's in the plate circuit of the last valve; where on earth else could you have it?"

"That's just where I wouldn't have it. Have you by any chance got the makers' characteristic curves of that valve? They are probably on a printed slip inside the box."

that valve you will find that it isn't passing anything like 30 milliamperes."

Bradlow adjusted the grid bias, went across to the cupboard, dug out a milliammeter and wired it up. The instrument recorded not quite 25 milliamperes.

"If you'll glance at these curves," I said with a grin, "you'll see that a plate current of 25 milliamperes with a negative grid bias of 15 corresponds to a plate voltage of about 125. And this is what your plate voltage is."

"But the batteries are right up my good man. Where on earth can the other 15 volts have gone to?"

"They are simply being wasted in the windings of the loud-speaker. You forget apparently that the loud-speaker itself has a considerable resistance and when you plump this into the plate circuit of a super-power valve you cause an appreciable drop in the actual plate voltage to occur. Another rather interesting point follows. Actually you apply the grid bias that the makers suggest for 140 volts on the plate."

"As a matter of fact," said Bradlow, "I put on rather more, for one nearly always finds that this can be done with advantage."

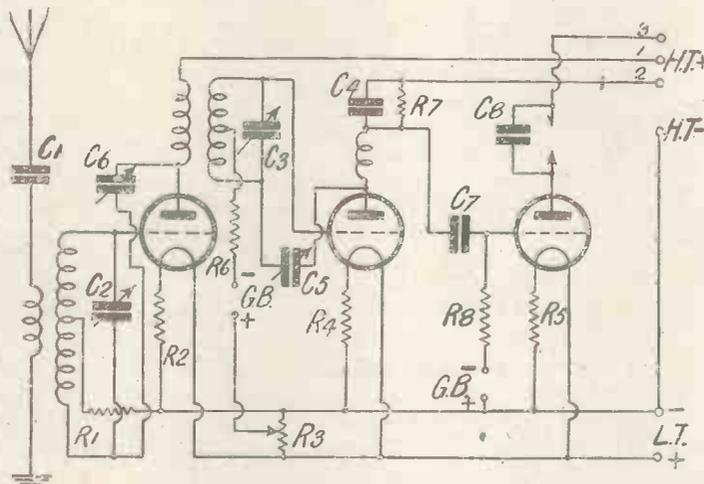
"In many cases it can, but what's actually happening here is this. You have grid biased on the assumption that the plate voltage is 140 when actually it is obviously considerably less.

The result is that you have taken the working point of the valve too low down and when a big grid voltage swing comes along it travels right on to the bent portion of the curve and you get distortion. By putting the loud-speaker slap into the plate circuit you have moved the whole curve to the right, but you have not altered the grid bias to correspond."

"And what do you suggest?"

"Well, in any case it is not fair to pass even a 25-milliampere current through the windings of a loud-speaker and there is no earthly reason why you should do so. A filter circuit will prevent this, and if the choke used is of reasonably small resistance

(Continued on page 1022)



The Circuit Diagram of Bradlow's Receiver

A NOTABLE addition to the beam wireless systems in this country are the new Marconi Dorchester Wireless beam transmitters and Somerton beam receivers. A recent visit to Dorchester made me realise (writes our Special Commissioner) what a tremendous amount of care and forethought has to be exercised in order to maintain reliable long-distance wireless communication.

When I arrived at the station the chief engineer showed me the ingenious safeguards that have been made to prevent all possibility of the aerials being blown down in a gale. Special compensating weight devices allow for wind variation, and in the event of a hurricane, several small lead-wire lashings break away, and although the aerial is then temporarily out of commission, no permanent damage is done.

#### The Aerials

In the case of the five beam aerials erected at Dorchester, each 270 ft. high, with 90-ft. crossbars, there is absolutely no swaying, and the wavelengths of the vertical aerials and reflectors, on the triatic suspensions, are maintained constant.

The "feeder" wires, which are copper tubes carrying the signals from the transmitters inside the building adjoining the masts, are enclosed in copper pipes fixed close to the ground.

#### The Transmitting Panels

Inside the main transmitting building one was reminded of a ship, with the transmitting panels on the "quarter deck"

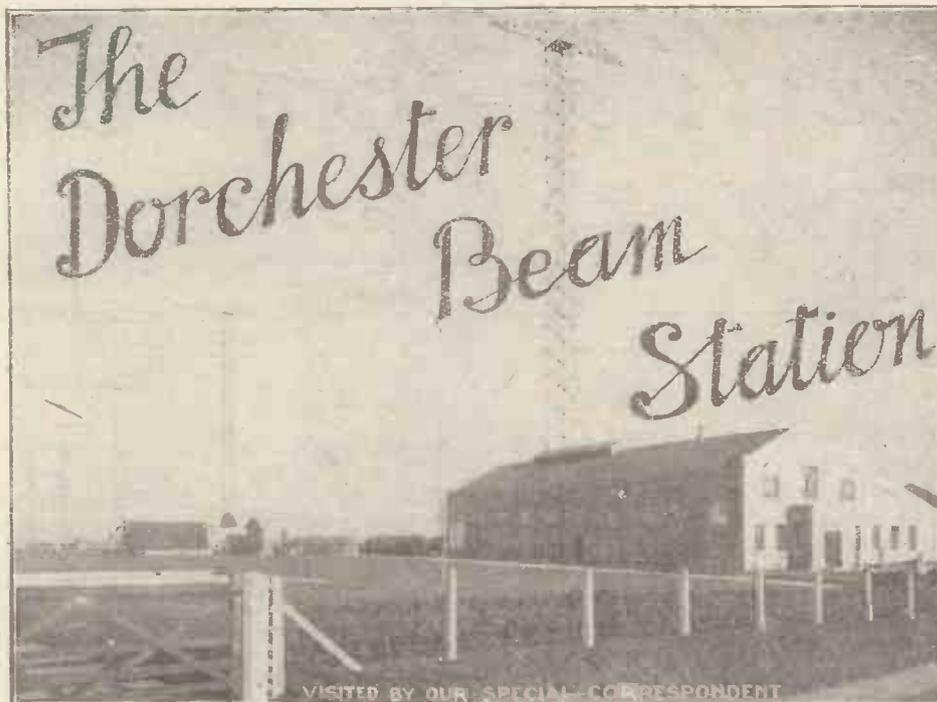


Photo: Marconi's Wireless Telegraph Co., Ltd.

and the absorbing and starting chambers "below." Here again, vibration has been eliminated by mounting the concrete floor on a bed of cork.

#### Valve Safeguards

An intriguing part of the transmitter room was the safety device for the valves. The main transmitting valves are oil-cooled, and if the oil supply failed the valves would be quickly ruined and the transmitter stopped.

If the oil failed a bell would automatically ring and the engineer in charge could see at once by looking at the lights which transmitter was involved. This contingency has never arisen, but the precautions are very necessary.

Down "below" I inspected the resistance-absorbing chambers. They are not unlike condemned cells—some one alluded to them as condemned electric cells! From a control above, the "starting" resistances in one chamber can be brought into action by means of selectors; other chambers house

"fixed resistors," about 4 ft. square! Various loads for the different transmitters are thus obtained with a common supply generated in a separate building.

In a temporary building are housed the two active transmitters, sending to Rio de Janeiro and Buenos Aires. Short-wave enthusiasts may care to note that GLW transmits to Rio and Buenos Aires on 15.706 metres. Calibration readings can also be made by noting GLH on 22.167 metres and GLK on 37.476 metres.

#### Checking Undulators

A checking undulator gives a good visible indication on inked strips of the "stuff" going out to South America.

Aurally, an indication of the note being transmitted is given by a small oscillator detector and loud-speaker connected up so that the heterodyned note is reproduced in the loud-speaker. Any frequency variation would cause an audible note variation in the loud-speaker reproduction.

#### The Somerton Receiver

A thirty-mile car drive through the sunlit lanes of Dorset and Somerset brought us to Somerton, the receiving end of the new beam installation. The masts are almost identical with those at Dorchester, for the same system of signal concentration is employed at the receiver as at the transmitter.

The Somerton buildings are not so near completion as at Dorchester, although they will be very solid and imposing eventually. Inside I saw three recording instruments

(Continued on page 1021)

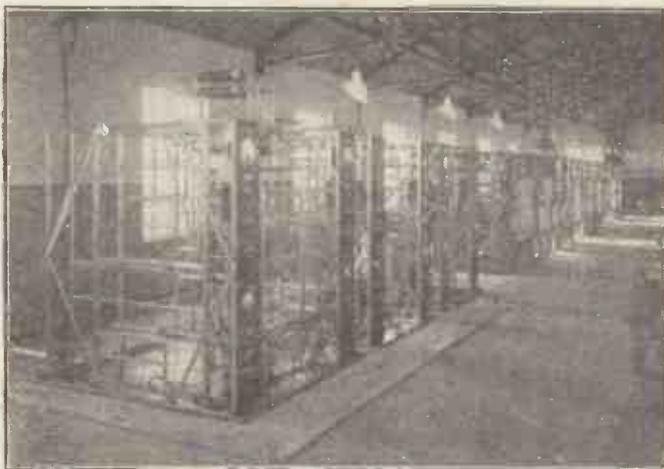
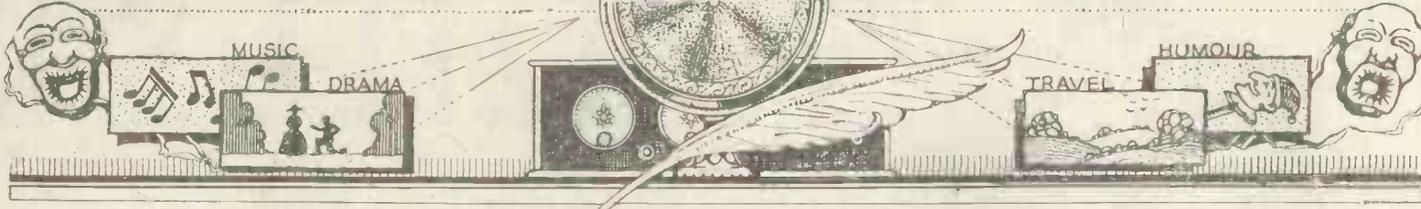


Photo: Marconi's Wireless Telegraph Co., Ltd.

These two photographs show the Dorchester Beam Transmitting Gear. The New York and Rio de Janeiro apparatus is in the right-hand picture.

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney A. Moseley*

OWING to my seasonable stay in bed—atishoo!—I have had days and nights of wireless. “*Vive le télégraphie sans fils!*” must be the counterpane cry of the world’s invalids, for it certainly helps one to take one’s gruel neat. Actually, it is the best mood to cultivate—this quiescent concentrated attitude of humility. Well, let’s see!

An interesting bedside talk was that of Mr. Neville Sharp, who told us about nasty “Gorillas,” who apparently are not the drawing-room pets one imagined them to be. When they catch you, they are not at all careful where they hit you, or how often. Mr. Sharp’s information about the family parties of friend gorilla induced me to lock my door that night. You never know.

They make a mistake in exaggerating the importance of “stars,” with the consequence that they rarely come up to “publicity” point. We were told that the return of Miss Gertrude Lawrence was the chief event of the theatrical season. Well, as good as it was, she certainly wasn’t the chief event of the wireless season. The new kiddies’ songs were bright and whimsical, but I wish they could have let us judge from the performance and not from her press cuttings.

Neil Kenyon, in a rather more subdued mood, did me his wittiest bits, although the *claque* forgot to cackle at some of his subtle jokes. Ethel Hook sang some *chic* songs clearly. An extra turn of “Three Something or Other Sisters” might have saved themselves the trouble. Who let them in, I wonder?

It mustn’t be assumed that because one of the B.B.C. Symphony Concerts was held at the People’s Palace, Mile End, that this means the hall is filled with East-enders. Judging from the enthusiasm, however, you could have thought they were from the neighbouring homes of Stepney, Whitechapel and Bow, for the East-ender knows how to appreciate good music when he hears it. I remember hearing the highest-brow chamber music in a packed Art Gallery in Whitechapel Road some twenty years ago. Even so I was amazed at the remarkable reception given to Roy Henderson the other night when he sang “To the

Forest,” by Tchaikovsky and “A Rebel Song,” by Arthur Sandford, deservedly so, let me add.

Miss Ida Gilbert’s reciting was not so affected as is usually the case with those who take all the licence allowed by the poets. Not over-emphasised, nor maudlin.

“Songs for My Little Ones,” taken from “Punch” and set to music by Sir Frederic Cowen, were irresistible. They were delightfully rendered by Dora Labbette, singer, composer and author making a treble success.

Who is the genius who gives the titles to the talks? Particularly the series I commented on the other day—about a grandiloquent talk from what was quite a simple task—and now we have an interesting talk on the art of modern advertising, labelled as “Men and Machines—Men and Markets.” Enough to scare away the mildest of talk fans.

I didn’t hear all of *The House Agent* described as a comedy by Gerald Grace. But on the principle that you needn’t taste the whole of an egg in order to pronounce

judgment on it, I think that this was a piece that should have been “let” alone. It was kindly transmitted from Birmingham, who apparently wished to share this short, theatrical property-like house agent with us.

I had hoped to be able to report well on the Bishopsgate Institute production of *King Arthur* (Purcell), especially since I was a humble member of the choir countless years ago. I fear, however, that Purcell didn’t quite “come up” on this occasion, and I was relieved when I heard Palmer’s voice butting in at 10 o’clock.

Mr. Leonard Dennis played on the violoncello a piece entitled “Londonderry Air” “arranged by Trowell.” Shouldn’t it have been “laid on with?”

Bravo the Liverpool Philharmonic Society. Actually finished the first part of a fine concert *before* time! I often wonder what the uninterested listener must think when he hears a dreary piece followed by tumultuous applause. I found, for instance Strauss’ symphonic poem “Don Quixote” heavy and needing complete concentration; but from its reception by an audience of music-lovers, I judged that I was not in the right receptive mood.

## G.M.T. FOR THE WORLD!

A BRITISH time signal is now being transmitted from the Post Office Wireless Station at Rugby, twice daily during the five minutes terminating at 10 a.m. and 6 p.m. Greenwich Mean Time. Each transmission, which will be controlled from the standard clock at Greenwich Observatory, will be of the type proposed by the International Time Commission 1925, and known as the “International System of Rhythmic Wireless Time Signals.” It will consist of a series of 306 signals transmitted in 300 seconds of mean time. Each minute will be clearly marked by a dash of two-fifths of a second duration, beginning on the exact minute. The dashes at the 55th, 56th, 57th, 58th and 59th minutes will be followed by a succession of 60 dots spaced at equal intervals following the commencement of the dashes at these minutes. The hour will be indicated by a dash of similar duration to the others commencing on the exact hour.



Eugene Goossens, the famous Orchestral Conductor, who has on several occasions conducted the Wireless Orchestra.

# A HARTLEY D.X.

SELECTIVE :: SIMPLE ::  
POWERFUL :: DISTORTIONLESS

Designed, Built and Tested by the "A.W."



A REMARKABLY efficient one-valve set, which we called the "Hartley D.X. One-valver," was described last July in AMATEUR WIRELESS, and highly gratifying results were obtained by readers who constructed it.

We have incorporated the basic circuit of this one-valver in the "Hartley D.X. Three-valver," which is in reality a "loud-speaker" edition of the original one-valver.

### Hartley Circuit

The Hartley circuit has great possibilities. It gives greater selectivity and volume than the "modifications" of the Reinartz circuit. It is essentially a simple circuit, and therefore inexpensive in its practical form.

As some readers know, the Hartley circuit utilises one centre-tapped coil, which is used for both tuning and reaction. We connect the earth to the centre-tap of the coil and one side of the reaction condenser to the lower end of the coil.

The immediate effect of this procedure is a reduction of rectifier damping and a consequent improvement in selectivity. It will be clear from an examination of the circuit diagram that the grid-filament circuit of the detector valve is connected across the top half of the coil, although the whole coil is tuned by the variable condenser.

By inserting an H.F. choke in the anode circuit of the detector valve we can divert the "reaction" component of the rectified current through the variable reaction condenser.

In practice a smooth reaction-application is obtained and the tuning is noticeably "sharp."

### Solving the Problem

The circuit is therefore eminently suitable for the average listener's requirements. One half of the problem is solved by the choice of the detector and reaction arrangement.

What of the L.F. side? That is equally important from the listener's point of view. Because we fully appreciate this we have selected what we consider to be an almost

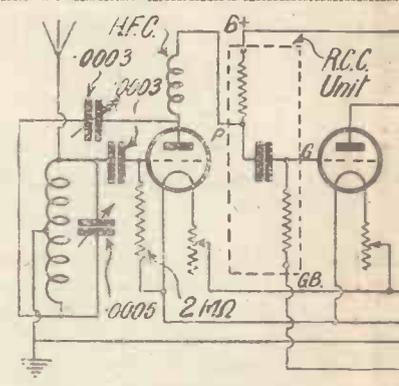
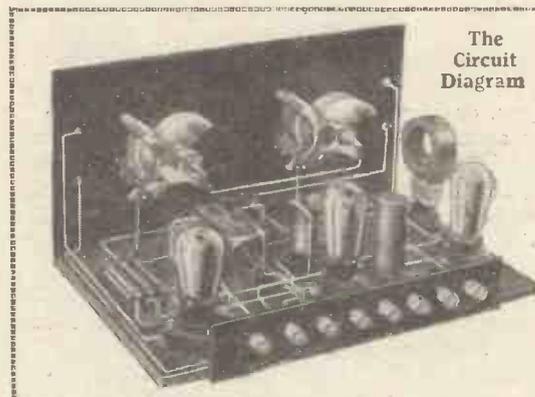
ideal, and, at the same time, practicable L.F. arrangement.

It consists of a resistance-capacity-coupled stage followed by a transformer-coupled stage of L.F. amplification. Provided a good L.F. transformer is used, an approach to the ideal of straight-line amplification is achieved.

insulated "series" clip is attached to the grid condenser. This clip is clamped under the grid-condenser terminal that goes to the aerial end of the tuning coil, but is quite insulated from it.

### Resistors

A separate resistor is provided for each



The R.C. stage passes on well-accentuated low notes and the transformer stage evens things up by amplifying the high notes to a greater extent than the low notes. The resulting reproduction is extremely pleasing, and the volume is full-bodied enough to fill a large room.

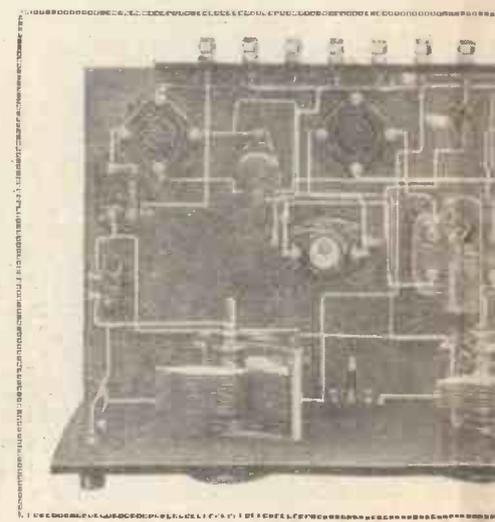
### Complete Circuit

The complete circuit arrangement is given by the theoretical circuit diagram shown in these pages. The centre-tap coil connections are clearly shown. The aerial is connected to the top of the coil, the earth to the centre-tap, and the free end of the centre-tap coil is taken through the .0003-microfarad reaction condenser to the anode of the detector valve.

The .0005-microfarad variable tuning condenser is connected across the whole coil. A No. 75 centre-tapped coil is recommended for the broadcast band of wavelengths. The valve rectifies on the leaky-grid-condenser principle, and for this purpose a .0003-microfarad fixed condenser and a 2-megohm grid leak are connected as shown. The grid leak is connected between the grid and L.T.+, and to do this an

valve filament, and by using a three-way Lorientat it is possible to enjoy the luxury of separate filament control without complication. In the Lorientat there are three separate resistance solenoids with sliders arranged to vary each resistance.

At one end there is a terminal common to all three resistances, and this is wired to



# THREE

SENSITIVE  
INEXPENSIVE

Technical Staff



a 2-megohm grid leak. The second and third valves are coupled with a transformer, and if good quality is of paramount importance, use a good one. It will be seen that there are two H.T. + tapping, one common to the anodes of the first two valves and a separate tapping for the power

G.B.—1 being taken from the "free" end of grid leak of the R.C. coupler and G.B.—2 from the IS connection of the L.F. transformer.

H.T.— and L.T.— are "commoned" and earthed. This is the best method of joining the H.T. and L.T. batteries together, and is a standard arrangement in all AMATEUR WIRELESS receivers.

Readers desiring to duplicate the photographed model of the "Hartley D.X. Three" will require the following components, and in cases where difficulty is experienced in following diagrams, a full-size blueprint should be ordered at the same time. This can be obtained, price 1s., post free, from this office.

### Components Required

Ebonite or bakelite panel, 16 in. by 8 in. by 1/4 in. (Ebonart, Raymond, Becol, Peto-Scott, or Pertinax).

.0005-microfarad variable condenser (Centroid, Burton, Cyldon or Ormond).

.0003-microfarad variable condenser (Centroid, Burton, Cyldon or Ormond).

Push-pull filament switch (L. & P., Trix, Lissen or Wearite).

Three anti-microphonic valve-holders (Benjamin, Lotus or Lissen).

Single baseboard coil-mount (Lissen or L. & P.).

.0003-microfarad fixed condenser with series clip (Dubilier, Lissen, C.D.M. or T.C.C.)  
2-megohm grid leak (Dubilier, Lissen, C.D.M. or T.C.C.).

Resistance coupling unit (R.I. & Varley, Dubilier, Carborundum or Lissen).

High-frequency choke (Lissen, R.I. and Varley, Trix or Wearite).

Low-frequency transformer (Powquip, Ferranti or B.T.H.).

One 3-way Lorioostat.

Ebonite or bakelite strip, 12 in by 2 in. by 1/4 in. (Becol).

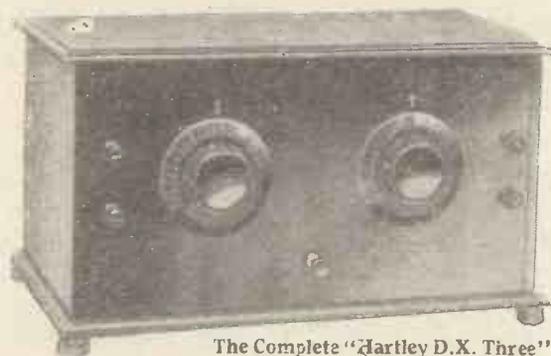
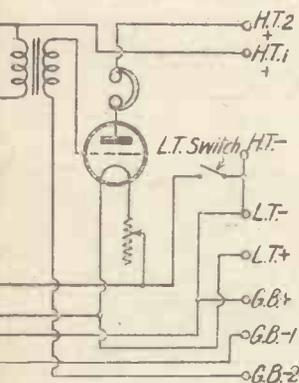
Four insulated terminals marked Aerial, Earth, L.S.+, L.S.— (Belling-Lee or Eastick).

valve. Here let us emphasise a frequently overlooked, but nevertheless very important, point. Do not expect to get proper reaction when H.T.+1 is taken to a 40-volt tapping!

With a 250,000-ohm resistance in series the volts on the anode of the detector anode would be considerably less than 40.

one side of the filament switch. The three separate connections at the other end of the Lorioostat go to the individual filaments.

Since the Lorioostat is essentially a "stay-put" baseboard component, a filament control in the form of a push-pull switch is mounted on the panel. A type "A" R.I. and Varley R.C. unit couples the detector



The Complete "Hartley D.X. Three"

and first L.F. valves. If an alternative R.C. unit is employed, see to it that the anode resistance does not exceed 250,000 ohms, or difficulty may be experienced in getting reaction.

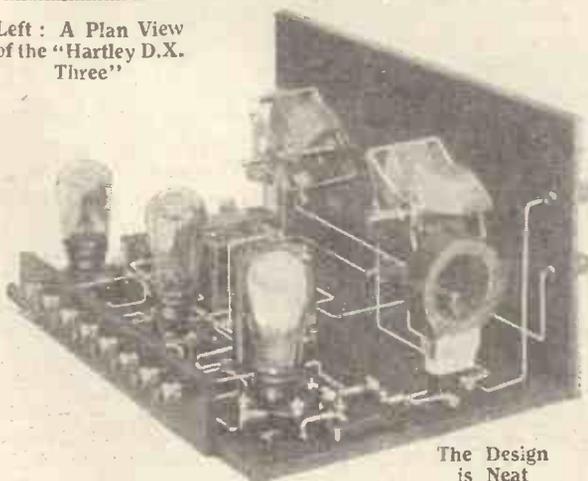
If separate R.C. components are used, we recommend a 250,000-ohm anode resistance, a .005-microfarad coupling condenser, and

For best results 100 volts or more should be applied, and if 120 volts is the maximum pressure available, connect H.T.+1 and H.T.+2 together and take a single lead to the full 120 volts.

### Grid Bias

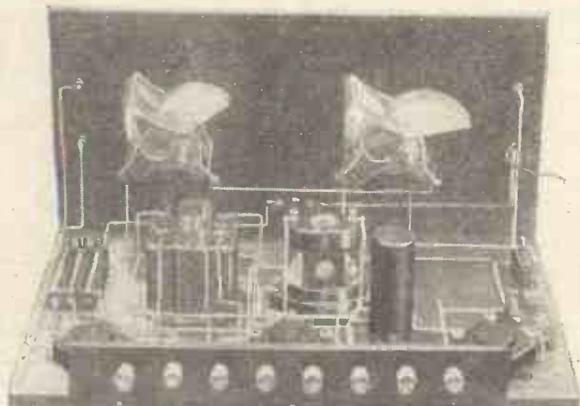
Grid bias is provided for each L.F. valve,

Left: A Plan View of the "Hartley D.X. Three"



The Design is Neat

A Rear View of the Finished Receiver



# "A HARTLEY D.X. THREE" (Continued from preceding page)

Eight terminals marked L.T.+, L.T.-, H.T.-, H.T.+1, H.T.+2, G.B.+ , G.B.-1, G.B.-2 (Belling-Lee or Eastick)

Connecting wire (Glazite or Junit)  
Two dial indicators (Deckorem).

### Construction

With these parts available the constructional work, which is well within the capabilities of all AMATEUR WIRELESS readers, can be put in hand. The panel drilling is quite straightforward, and the

the extreme right of the baseboard, and near it the grid leak and condenser. The three valve-holders are arranged in a line in front of the terminal strip. The H.F. choke, R.C. unit, L.F. transformer, and three-way Liorostat are grouped in the positions shown.

### Wiring

We used white Glazite wire for connecting up the components, although the constructor can use his own discretion in the matter. A good alternative to covered wire is Junit self-soldering wire. There is one flexible connection, consisting of a 5-in. length of Lewcos rubber-covered flex from the earth terminal, terminating in a small spade tag to facilitate the interchanging of plug-in centre-tap coils.

### Testing

Carefully check over the wiring with the blueprint or theoretical diagram, paying special attention to the battery connections.

In our reception tests we used a Cossor 210RC detector valve, a Cossor 210RC for the second valve, and a Cossor Stentor Two in the last valve-holder. Suitable alternatives are given in the valve table.

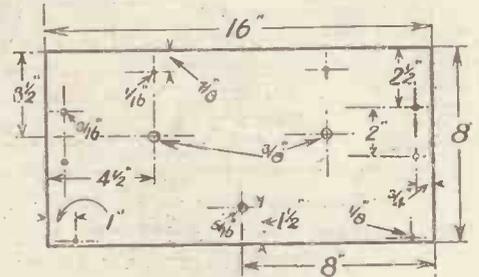
### Results

With a No. 75 centre-tapped Lewcos coil very satisfactory results were obtained. The local station (2LO), at five miles, was brought in at great strength and purity, while 5GB was received at slightly diminished volume without interference from 2LO. Many other D.X. stations were tuned in including Madrid, Langenberg, Toulouse, Poland, PTT, Dortmund, Stuttgart, and Dublin, some clear of interference and some suffering from local-station "blanketing" and heterodyning.

### Operation

The simplicity of operation of this receiver is one of its best characteristics. It is only necessary, after connecting up batteries, aerial, earth, etc., to pull out the filament switch and rotate the left-hand dial for wavelength change and slowly to vary the right-hand dial to alter the amount of reaction applied.

Of course, it is necessary to make several preliminary adjustments. The grid-bias tappings and the filament resistors should be varied until satisfactory results are obtained.



Details of Panel

When these preliminaries are over, the receiver can be housed in a suitable cabinet, such as Messrs. Carrington can supply.

### TWO-VOLT VALVES FOR THE "HARTLEY D.X. THREE"

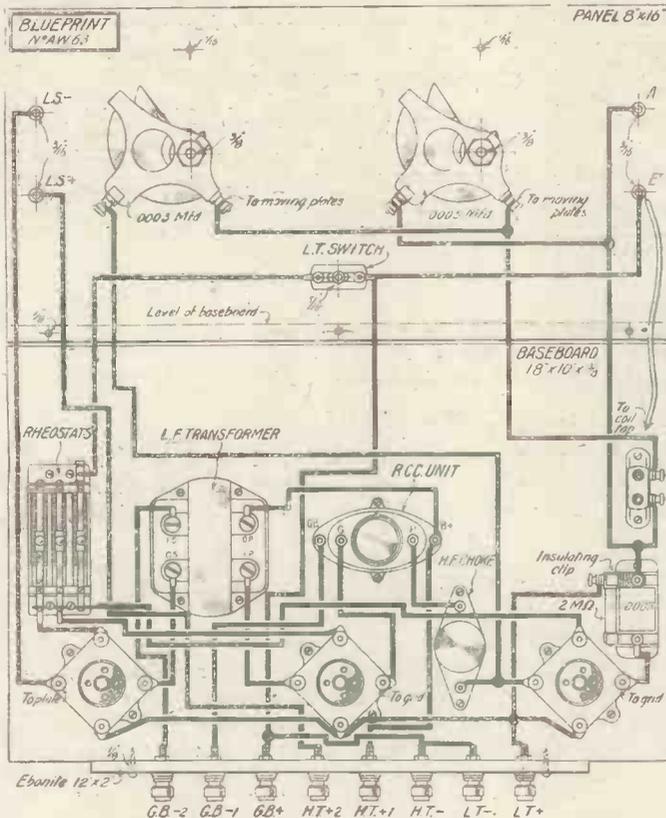
Make	Detector	1st L.F.	2nd L.F.
B.T.H.	B8	B22	B23
Cosmos	SP18/B	SP16/R	SP18/RR
Cossor	210RC	210LF	Stentor 2
Ediswan	RC2	GP2	PV2
Marconi	DEH210	DEL210	{ DEP240 { DEP215
Mullard	PM1A	PM1	{ PM2 { PM256
Osram	DEH210	DEC210	{ DEP240 { DEP215
Six-Sixty	SS210RC	SS210HF	SS215P

N.B.—Corresponding 4-volt and 6-volt valves of the type specified, above can of course be substituted for the 2-volt valves mentioned.

### WIRELESS TRADER YEAR BOOK

COPIES of the "Wireless Trader Year Book and Diary for 1928" have been received from the Trader Publishing Co., Ltd.

This book has amply proved its worth in the hands of wireless traders all over the country in previous years. As usual, there is a large section devoted to a well-spaced day-to-day diary for the whole year, 1928. There are four main sections, to the Trader Year Book: (1) is devoted to general information, such as calendars, summary of Workshops Act, etc., (2) deals with broadcasting and trade matters, including a valuable summary of special interest to our readers concerning the true position in which they stand with regard to the Marconi Patent Licence; (3) technical data which covers a wide field, and (4) the directory of trade and professional addresses associated with wireless.



The Wiring Diagram of the "Hartley Three" (Blueprint available, price 1/-)

dimensions of the holes to take the two variable condensers, filament switch, and A, E, L.S.+, L.S.- terminals are given by the drilling diagram. The dial indicators, be it noted, are correctly placed for the particular dials used, and if any other condenser dial is incorporated the indicators may have to be fitted in different positions.

Three wood screws secure the panel to the baseboard, and if extra support is required, there are suitable panel brackets available.

While drilling operations are going on it is as well to drill the terminal strip to take the eight battery terminals in the order shown in the reduced reproduction of the blueprint.

The baseboard components are disposed in the manner indicated in the blueprint. Looking at the back of panel, as in the blueprint, the centre-tap coil mount is on



**THERE'S  
FIGHTING SPIRIT**  
in  
every **LISSEN Battery**

which stubbornly resists volt drop, which resists the strain of the longest programme—a fighting spirit which never tires, which sustains the energy of the battery throughout the longest period of use, maintaining the electronic emission of the valves always at a high value. And this energy is the result of the free oxygen liberation of each cell, which is copious beyond description because of the new chemical combination and process of making which is known only to LISSEN.

Whenever there is a fine piece of music broadcast, hear it with a LISSEN Battery in your set, and you will appreciate a new power smoothness and a new tone clarity in your loud-speaker which was never there before.

10,000 dealers are now selling the LISSEN Secret Process Battery at a price which has been made low to bring it within the reach of all. Next time you want a good battery take no other than a LISSEN, and your insistence will be rewarded by the vastly improved reproduction of your next radio programme.

**LISSEN**

SECRET PROCESS

**BATTERY**

7/11  
12/11  
10/6  
1/6

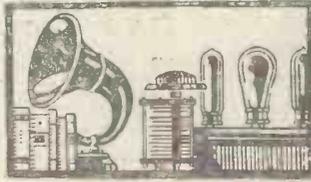
60 volts (reads 66) 7/11  
100 volts (reads 108) - 12/11  
9 volts (grid bias) - 1/6

LISSEN LIMITED, 16-20 FRIARS LANE, RICHMOND, Surrey

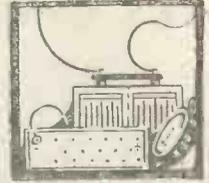
Managing Director: THOMAS N. COLE

L 418

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention



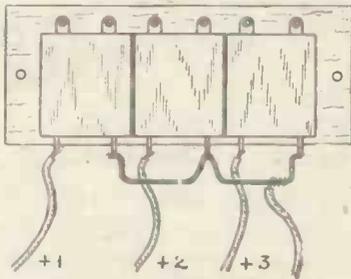
# PRACTICAL ODDS & ENDS



## Mounting H.T.B. Condensers

WHEN 2-microfarad reservoir condensers are used in conjunction with dry H.T. batteries their size and shape often present a mounting difficulty. Many amateurs arrange them as a separate unit, but the problem can usually be solved in the following way.

With most types of cabinet fitted with lids it is a very simple matter to mount them inside the receiver, out of sight. To do this, place the condensers close together, solder on the busbar link which connects one side of each, and screw them to a piece of board in the manner shown in the sketch. Then solder flexible leads to the other three contacts and to any convenient part of the busbar, and screw the board to the inside back wall of the cabinet, near the top, directly above the H.T. terminals. It is then only necessary to shorten the leads (if necessary) and solder them to



Mounting H.T.B. Condensers

their respective terminal shanks, or to busbar leads common to the shanks.

O. J. R.

## Insulating Battery Terminals

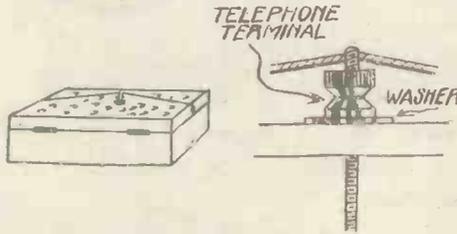
IT is always advisable to have insulated terminals on the terminal strip of a receiver. If these are not available ordinary terminals may easily be insulated by simply giving them an external coating of cobbler's wax or Chatterton's compound. This is done by melting the wax and dipping the terminals in it, taking care not to immerse the shank by which the terminal may be held for this purpose. The head of the terminal also should be screwed tightly on to the base before dipping them, to keep the contact faces quite clean of wax.

S. B.

## For Battery Cases

IT often happens that the lids of H.T. battery boxes become damp, swell and bulge upwards, making the clips miss contact with the cells altogether or, at least,

making an unstable connection. The trouble can be rectified if a terminal is fixed in the lid and a wire passing through it is secured firmly to each side of the lid.



A Battery Case Remedy

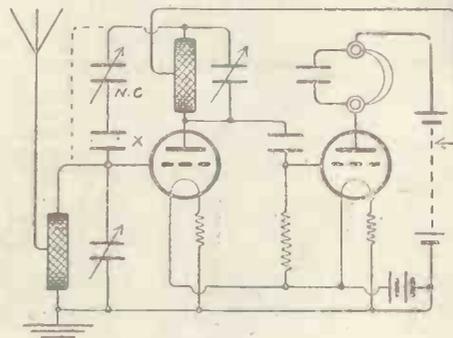
The wire should be preferably of steel.

Great tension can then be exerted on the lid by means of the terminal nut. F. J.

## A Safety-first Hint

THE small neutralising or balancing condenser used in circuits embodying the neutrodyne method of H.F. coupling is regarded by many amateurs as an unimportant component which can be quickly made from any odd pieces of scrap material. This is a great mistake, for the "neut" is a most important component, and unless properly made one runs the risk of damaging the H.T. battery, and often the accumulator and valves.

The sketch herewith shows a simple circuit embodying a neutrodyne stage of H.F. amplification with detector valve, and it will be seen that if the neutrodyne condenser N.C. is defective, and the moving



A Safety-first Hint

plate should happen to make contact with the fixed plate, the H.T. battery is "shorted," i.e., more or less ruined. This will be perfectly clear by following the H.T. positive lead through the top half of the anode coil, down the dotted line (representing short circuit) and through the aerial coil, and then along to H.T.

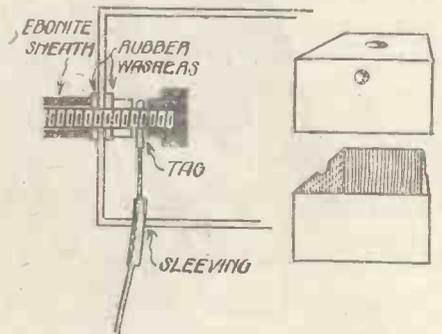
negative. Now, if the H.T. negative should be connected to L.T. positive, that which occurs is of a far more serious nature, for in this case the accumulator is in series with the H.T.B., and the valve filaments are, of course, in parallel with the accumulator; so that, after passing through the aerial coil, the H.T. current must run through the valve filaments and accumulator before arriving at the H.T. negative, and the result is (1) burnt-out valves, (2) short circuit across accumulator, and (3) short circuit across H.T.B.

Disasters (1) and (2) can be avoided by connecting the H.T. negative to the L.T. negative, as shown; but (3) is unavoidable, and it is *always* advisable to insert a fixed condenser x, having a value of about .01 microfarad, in series with the "neut."

J. O.

## Cover for Lead-in Tube

THE exposure to the weather of the junction between aerial lead and



Cover for Lead-in Connections

lead-in tube is a frequent source of inefficiency. The following simple and cheap device will be found to give adequate protection in the majority of cases.

Two holes of the diameter of the lead-in rod are bored in a small strong cardboard box of cubical shape, side approximately 2 1/2 in. The whole box and lid are then impregnated with good shellac varnish, till they dry quite stiff and waterproof. The box is passed, between two rubber washers, over the two B.A. studding projecting from the ebonite sheath of the "tube," and fixed with one corner uppermost by means of the original nut. The lead-in passes through the hole in the lower side of the box. This prevents rain running down the lead on to the connection.

A. B.

'A.W.' Solves Your Wireless Problems.



# The H.T. Supply that does not fail

When you use an Igranic H.T. Supply Unit, Battery troubles are done away with, and you obtain a constant, dependable high-tension supply without any of the worry and expense of replacing dry batteries or charging accumulators, and without those long spells of noisy, distorted reception before you finally are compelled to buy new batteries.

## Igranic H.T. Supply Units

are obtainable to work off A.C. mains of any voltage or periodicity and give an ample supply of absolutely silent current at voltages to suit any set.

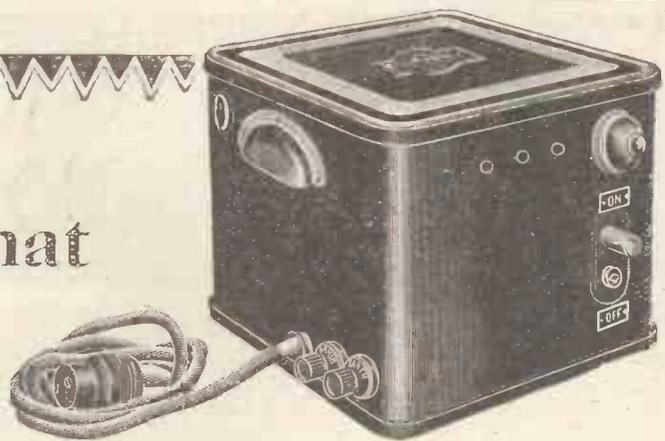
List No. D77, containing full particulars, will gladly be sent on request.

Igranic components are always stocked by reputable dealers. All reports received by us of difficulty in obtaining them receive immediate attention.

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### Igranic H.T. Supply Units and Automatic L.T. Battery Chargers

Model V208.—Maximum output, 200 volts; 30 milliamps. Ten alternative output voltages.

Price £9 10s.

Full Wave Rectifying Valve .. Price £1 2 6  
Marconi Royalty .. .. . " 0 12 6

Model V127.—Maximum output, 120 volts; 20 milliamps. Seven alternative voltages.

Price £7 10s.

Full Wave Rectifying Valve .. Price £1 2 6  
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Price £4 18s.

Half Wave Rectifying Valve .. Price £0 15 0  
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Model V208A.—Incorporates H.T. Supply Unit, Model V208, together with an automatic L.T. Battery Charger for 2-, 4-, or 6-volt accumulators.

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H.T. Rectifying Valve .. Price £1 2 6  
L.T. Rectifying Valve .. .. " 0 12 6  
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Model V127A.—Incorporates H.T. Supply Unit, Model V127, together with an automatic L.T. Battery Charger, for 2-, 4-, or 6-volt accumulators.

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## Razor-sharp Wavemeter

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J. H. REYNER, B.Sc., A.M.I.E.E.

Write for Envelope No. 14 giving full details, including blueprints, photographs, and calibration charts.

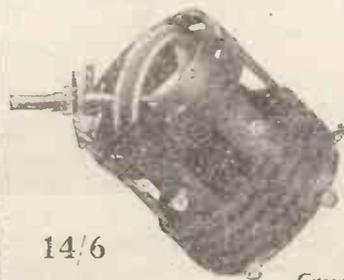
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250 to 550 and 1500 to 2000 metres



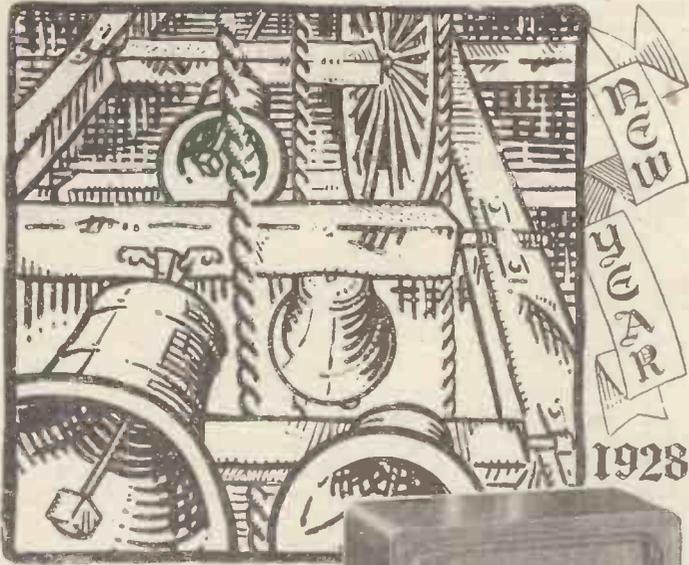
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This Tuner is constructed on Low Loss Principles with Solenoid and Bankwound Coils, acknowledged to be the most efficient form of coil winding. It is so arranged that a two-contact Push-Pull Switch shorts the high wave coil, leaving only the low wave coil in circuit.

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1928

The outstanding quality of reproduction and the attractive appearance of the "Beco" Cone Loud-speaker command the admiration of all who see and hear one in operation.



## "Clear as a Bell"

The "Beco" Popular Model has gained great popularity because it imparts to all broadcast reception the clarity and purity of tone essential to the full enjoyment of radio entertainment.

It is a "Cone" type speaker which handles without distortion the volume obtained from even multi-valve receivers, while at the same time it is fully sensitive to the weakest signals.

Another important reason for its popularity is the fact that it is a low-priced instrument which gives results equal to and, in many instances, better than those costing twice as much.

YOUR LOCAL DEALER WILL DEMONSTRATE  
A "BECO" POPULAR MODEL TO YOU

Specification: The "Beco" Popular Loud-speaker is enclosed in a handsome well-finished mahogany cabinet, has a sensitive diaphragm control, and terminals for connections to receiver; is 11 in. high, 8 in. wide, and 4 in. deep; is fitted with rubber feet to prevent scratching of any highly-polished surface, and to complete its excellent appearance a tasteful shade of green silk; is place behind the grille.

PRICE

47/6

British Electrical Sales Orgo.,  
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Advt. of British Electrical Manfg. Co., Hendon, N.W.9.

EVERYTHING **The G.E.C.** ELECTRICAL  
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Use the  
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New TYPE  
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RESISTANCE  
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To-day's popular  
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Amplification

The D.E.H. Group specially  
designed for this work—

TYPE	VOLTS	AMPLIFICATION		IMPEDANCE
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Osram D.E.H. 210	2 volts	35	75,000	} 10/6 each
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## "A.W." TESTS OF APPARATUS

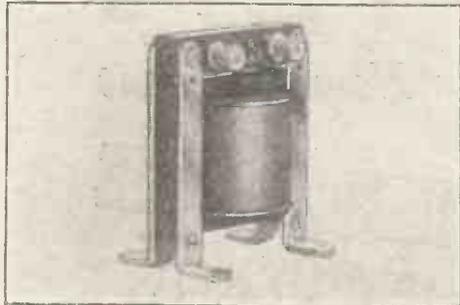
Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

### Powquip L.F. Choke

**C**HOKER coupling is popular with a wide section of the wireless community, since it is possible, with this form of coupling, to obtain excellent reproduction and good amplification per stage. The Powquip L.F. choke, which we recently tested, is designed to operate in low-frequency amplifying circuits, and is suitable for use in conjunction with moderate and low-impedance valves.

The choke consists of a high-inductance winding surrounded by a reasonably efficient iron core, consisting of the normal iron laminations. The ends of the windings are taken to two terminals mounted on an insulated strip held between the two metal supports which also form a stand for the component.

Tested on the standard laboratory inductance bridge, this choke proved to have an inductance of 25 henries and a D.C. resistance of 750 ohms: it is therefore suitable for general use in low-frequency circuits, and should maintain a constant



Powquip L.F. Choke

amplification over a wide range of audible frequencies.

The choke is manufactured by the Power Equipment Co., Ltd., of Kingsbury Works, The Hyde, Hendon, N.W.9. We can recommend it to readers.

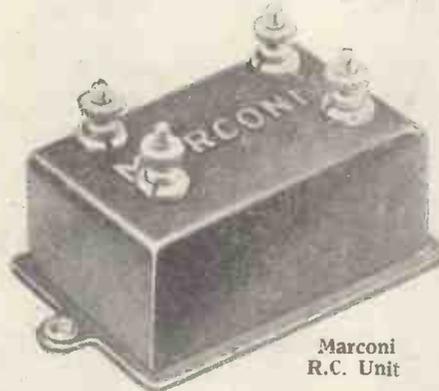
### Marconi R.C. Unit

**R**ESISTANCE-CAPACITY coupling units are sometimes designed so that they are suitable for use only with high-impedance valves. Such a valve is often incapable of handling large grid voltage swings, and in consequence it is undesirable to utilise these units in the last stages of an L.F. amplifier.

The L.F. R.C.C. unit, manufactured by the Marconiphone Co., Ltd., of 210-212 Tottenham Court Road, W.1, is designed to operate effectively with valves having a more extensive range of impedances. The resistances and condenser are mounted in a neat and small rectangular metal case, with

four terminals, suitably lettered. Since it is customary to shroud transformers in a metal case in order to prevent L.F. pick-up from one stage to another, it should be advantageous to extend this process to other forms of L.F. coupling.

Tested in our laboratories, the grid con-



Marconi R.C. Unit

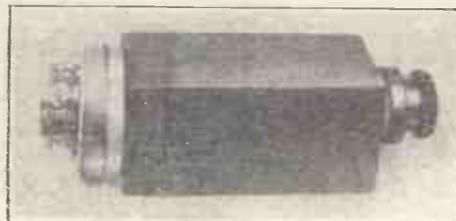
denser proved to have a capacity of approximately .0029 microfarad, while the anode resistance and grid leak had resistances of 250,000 ohms and 2.3 megohms respectively. These values are chosen with the object of obtaining even amplification over as wide a range of frequencies as possible, and this the unit accomplishes.

Both the finish and design of this component are good, whilst its performance was entirely satisfactory.

### A Safety Switch

**I**N order to avoid any risk of damage to a wireless receiver from lightning, it is necessary to be able to earth the aerial when the set is not in use. To be of any real service, however, the aerial should be earthed outside the house, and since few people wish to venture outside every time the aerial has to be earthed, some means of effecting this change-over from within is desirable.

The Universal Bracket Co., of Feltham Avenue, East Molesey, have designed a



A Safety Switch

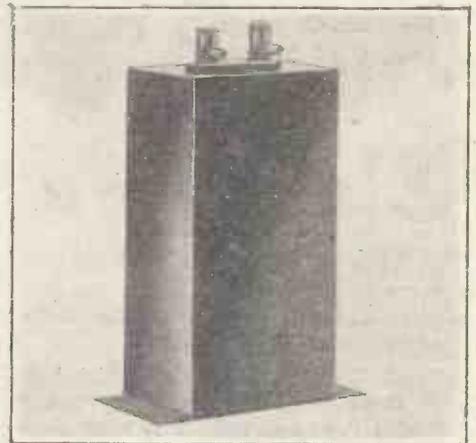
combined aerial lead-in and earthing switch adapted for fitting to a window frame. On the outside, two terminals are mounted on a substantial porcelain base. A threaded

brass spindle, electrically connected to the aerial terminal, runs through the centre of a hole drilled in the window frame. This spindle is constrained, by means of a spring, to make contact with a metal strip attached to the earth terminal, and by rotating an ebonite knob on the inside of the window, the spindle is drawn away until it ceases to make contact with the earth strip, while rotating the knob in the opposite direction earths the aerial again outside the house.

The spindle itself running through the window frame serves to lead the aerial into the room and a second terminal is provided for the lead to the set.

### Camden Mark IV Super-tension Condenser

**H**IGH-CAPACITY condensers, capable of standing up to continuous high-voltage work, are in considerable demand at the present time. Large numbers of wire-



Camden Super-tension Condenser

less enthusiasts are building their own mains units, which require efficient devices for smoothing out variations in the supply. Condensers are of the utmost importance in such circuits, and they must be able to withstand voltages considerably in excess of those actually obtained from the supply.

The 1-microfarad super-tension condenser submitted for test by the Camden Electrical Co., Stanley Chambers, Runcorn, is specially designed for high-tension work, and special care is taken to prevent the possibility of breakdown due to faulty internal insulation. On test we found that the condenser had a capacity of 1.2 microfarad, which is slightly in excess of the rated value, and is all to the good.

The instrument withstood 500 volts A.C. for a considerable period without breakdown. The condenser is attractively finished and can be recommended for general use.



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Be sure to specify Becol original Low Loss Former used in sets that have taken 1st, 2nd, 3rd and 4th prizes and gold medal. Packed in carton 3", 4", 6" lengths up to 36" lengths.

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**UNITES**

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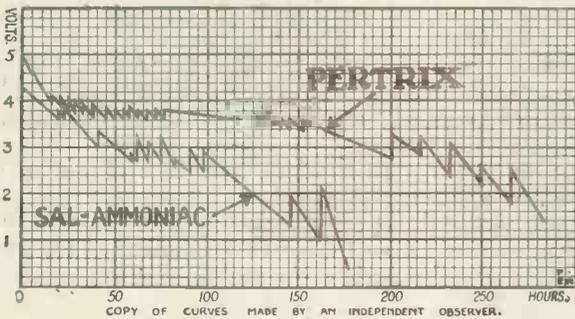
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All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4 and 2/8. Another use for Fluxite—Hardening Tools and Case Hardening. Ask for leaflets on improved methods.

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You'll wish you'd  
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Ask your  
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**RULES.**—Please write distinctly and question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below

#### Failing Volume.

**Q.**—My four-valve set, which has given me every satisfaction for the last six months, is now giving very poor results. Previously quite good volume was obtained on many stations, but now I can only receive the local station and the set cannot be made to squeal like it did when it worked quite well. Can you suggest where I might look for the trouble?—F. R. (Surrey).

**A.**—We are of the opinion that your trouble is due to your H.T. battery having become exhausted, and we feel sure that by replacing this component you will again get the good results which you previously experienced. Before going to this expense make sure that your aerial is not earthing and that you have no poor or broken connections in your aerial-earth system.—C. R.

#### R.C. Coupling.

**Q.**—What relationship should exist between the value of the anode resistance in the plate circuit of an R.C. valve and the internal impedance of the valve? I have seen this stated before but cannot call to mind the exact figures given. R. D. (Glam.).

**A.**—No hard and fast rule can be followed as far as this matter is concerned, as so much depends upon the values for the remaining

components in the coupling unit. A ready means of determining a value of anode resistance which will usually give quite satisfactory results is to multiply the internal resistance of

## When Asking Technical Queries—

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

the valve by three and take the result as being a representative value for the anode resistance in ohms. This figure will, of course, be the D.C. resistance of the anode resistance.—C. R.

#### Suitable Valves.

**Q.**—My set is a three-valve, detector and two L.F. amplifiers, and I find that by using a power valve for each stage of L.F. I get far better reproduction than by using an ordinary L.F. valve and a power valve in the first and second L.F. stages respectively. In view of the fact that the internal impedance of the power valve does not "match" the impedance of the primary winding of the second stage L.F. transformer, I should have thought that the power valve would have created distortion, instead of reducing it as it does at present. Can you suggest why this should be?—W. J. (London).

**A.**—The choice of valves in a case of this description is governed not only by the circuit and components in use, but also by the position of the receiving station. If, as in your case, the set is operated near to a main B.B.C. station, then it is the lesser evil to use a power valve for the first stage of L.F. to ensure that the signal energy does not overload the grid of the first L.F. valve. Where strong signals are being dealt with, it is always advisable to use a power valve for each L.F. stage, but if the signal energy rectified by the detector is not very powerful, then an ordinary L.F. valve for the first stage of amplification will give greater amplification and better reproduction.—A. C.

## For the Newcomer to Wireless: High and Low-frequency Amplification

I AM thinking of installing a three-valve set, and I am told that a good arrangement consists of a high-frequency valve, a rectifier, and a low-frequency valve. Can you explain this high-frequency and low-frequency business?

Let us see what we can do. We found a little while ago that energy reaches the aerial in the form of high-frequency or radio-frequency impulses, and we saw that the rate at which these oscillate depends upon the wavelength of the transmitting station. One of the duties of the rectifier, whether it is valve or crystal, is to convert these radio frequencies, which are far above the limitations of our hearing, into low-frequency or audio-frequency impulses which we can hear. Now, the rectifier does not function well if the impulses reaching it from the aerial are very tiny. In the same way our eyes have difficulty in distinguishing details of objects at a distance.

Yes, of course; and that's why we use telescopes and field glasses at times?

Exactly. And you may regard the high-frequency valve as the telescope of wireless. What it does is to receive radio-frequency impulses from the aerial

and to pass them on to the rectifier unchanged in shape, but greatly increased in magnitude. Just as the telescope enables the eye to see over great distances, so the radio-frequency valve enables the rectifier to receive at long range.

Can you use more than one of them?

Yes. Sets using two, three, or even five high-frequency valves are made; but there are limits to the number that can be usefully employed, since if we magnify too much in this way we bring up unwanted noises as well as the desired signals.

And what of the low-frequency valves? Are they the same, by the way, as note-magnifiers?

Audio-frequency valves, low-frequency valves, and note-magnifying valves are simply different names for the same things. What they do is to receive the output of the rectifier, which would be audible, though possibly rather faintly without them, and to magnify it until it reaches a desirable degree of loudness. If the radio-frequency valve corresponds to the telescope, the counterpart of the low-frequency valve is the microscope. The high-frequency valve

reduces distance, so to speak, and therefore increases the range of the receiving set. The note-magnifier does not markedly increase the range, but it enables us to hear perfectly sounds that without it might be rather difficult to catch.

Then which is it best to use in a receiving set?

It all depends upon what you want the set to do. If you are quite close to a main station and desire to hear only that station's programmes, you can work a loud-speaker by means of a rectifier, followed by one or more note-magnifying stages. If, on the other hand, the range is considerable, it is as well to have at least one high-frequency valve, for the efficiency of the rectifier increases enormously as the magnitude of the impulses delivered to it becomes greater. Then, too, there is the question of selectivity. Each high-frequency stage acts as a filter, and if several of them are used the tuning becomes exceedingly sharp. When, therefore, you wish to get rid of a powerful interfering signal at short range, in order to hear others at greater range, high-frequency amplification is advisable.



OK



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please!*

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6<sup>D</sup>

N.C.C. 265

# £35 Cash Competition

Open to Every Reader

Which is Your Favourite Circuit?

## PRIZES:

<b>First Prize</b> -	<b>£20</b>	<b>Fourth Prize</b> -	<b>£3</b>
<b>Second</b> ,, -	<b>£5</b>	<b>Fifth</b> ,, -	<b>£2</b>
<b>Third</b> ,, -	<b>£4</b>	<b>Sixth</b> ,, -	<b>£1</b>

To the right is a list of twelve popular sets or circuits. We invite you to tell us which among them are your favourites. To encourage you to take the little trouble necessary we are offering some splendid money prizes.

All you have to do is to select what you consider to be the six best sets or circuits and insert them in the special coupon given on this page in what you think to be their order of merit or popularity. With our readers' votes in hand, we shall be able to determine which set has the honour of first place and in what order of popularity the rest should come; then, in due course, we shall be able to give readers the advantage of our information.

Readers whose lists agree, or most nearly agree, with the majority result will win the prizes.

### RULES

#### TO BE MOST CAREFULLY OBSERVED

Every competitor agrees to accept the Editor's decision as final and as legally binding.

All entries to be written IN INK on the special coupon printed on this page.

Competitors may submit more than one coupon, but will not be awarded more than one prize.

In the event of two or more competitors tying for place, the Editor will decide as to the next step.

We bind ourselves to present prizes to a minimum total value of £35

We shall not be responsible for entries lost or mislaid.

No employee of Bernard Jones' Publications, Limited (the proprietors of AMATEUR WIRELESS), may compete.

The names and addresses of prize-winners will be announced in AMATEUR WIRELESS early in the New Year.

**SPECIAL NOTE.**—The closing date for entries is **December 31, 1927.**

- A** 2-valver.—Detector with reaction, followed by one transformer-coupled L.F. valve.
- B** 2-valver.—One reflexed valve, crystal detector, and one L.F. valve.
- C** 3-valver.—Detector, using anode-bend rectification, followed by two stages of resistance-capacity-coupled L.F.
- D** 3-valver.—High-frequency valve, neutralised; plug-in coils, by a detector valve and transformer-coupled L.F. valve.
- E** 3-valver.—Detector valve with reaction, followed by two transformer-coupled valves with switch to cut out last L.F. valve.
- F** 3-valver.—Detector with Reinartz reaction, followed by one resistance-coupled L.F. stage and one transformer-coupled L.F. stage.
- G** 4-valver.—High-frequency valve neutralised, plug-in coils, detector followed by two transformer-coupled L.F. valves.
- H** 4-valver.—High-frequency valve, neutralised, detector with reaction, followed by one resistance-coupled stage and one transformer stage of L.F.
- I** 4-valver.—Two high-frequency valves, neutralised, detector followed by transformer-coupled L.F.
- J** 4-valver.—Three high-frequency valves and detector.
- K** 5-valver.—Two high-frequency valves, neutralised, detector followed by two stages of L.F.
- L** 5-valver.—Two high-frequency valves and detector, neutralised and screened with single control; followed by one resistance-coupled L.F. and one transformer-coupled L.F.

### COUPON

Fill in this coupon IN INK, using the capital letters to identify the circuits. Then post it to:—

"My Favourite Circuit,"  
Amateur Wireless,  
58-61 Fetter Lane,  
London, E.C.4.

1st	
2nd	
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I agree to abide by the printed rules governing this competition.

Name .....

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Full-size Blueprints, each one being a photographic contact print, from the draughtsman's original design, and produced on stout paper, are now available of the following sets. Price, Post free.

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One-valver for Frame Aerial ...	W.M. 4	1 0	
One-valve All-wave Reinartz ...	A.W. 2	1 0	
All-in-all One-valver ...	A.W. 13	1 0	
Hartley DX One-valver ...	A.W. 27	1 3	
Alpha One* ...	W.M. 26	1 0	
Reinartz Plug-in One-valver ...	A.W. 46	1 0	
<b>TWO-VALVE SETS</b>			
All Broadcast Two* ...	W.M. 5	2 3	
Two-valver, embodying K.L. Valves ...	A.W. 5	1 0	
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Wide-world Short-wave Two ...	A.W. 11	1 0	
All-wave Two-valver ...	A.W. 15	2 3	
Loftin-White Two* ...	W.M. 20	2 3	
Reinartz Two ...	A.W. 21	1 0	
One-dial Two ...	W.M. 23	1 0	
Empire Short-wave Two ...	A.W. 28	1 0	
Screened-trap Two ...	A.W. 31	1 0	
"Next-step" Receiver ...	A.W. 34	1 3	
Girdle Two* ...	W.M. 30	1 3	
Centre-tap Two ...	A.W. 42	1 0	
Mains-fed Two ...	W.M. 37	1 0	
Three-option Two ...	A.W. 51	1 0	
The Rover Two ...	A.W. 53	1 0	
British Broadcast Two ...	W.M. 44	1 0	
General Purpose Two ...	A.W. 55	1 0	
All-wave Two ...	A.W. 57	1 0	
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<b>THREE-VALVE SETS</b>			
Continental Three ...	W.M. 7	1 0	
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Hi-mu R.C. Threes* ...	W.M. 9	2 3	
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"Home Station" Three ...	A.W. 45	1 0	
The "Economy" Three ...	A.W. 48	1 0	
Five-guinea Three ...	W.M. 29	1 0	
Dominions Short-wave Three ...	W.M. 39	1 0	
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The Ether Searcher Three ...	A.W. 52	1 0	
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A Tuned-anode Three-four ...	A.W. 40	1 6	
Concord Three-four ...	W.M. 45	1 6	
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M.C. Four ...	A.W. 8	1 6	
Household Four ...	A.W. 17	1 6	
Revelation Four ...	W.M. 24	1 6	
Auto-selector Four ...	W.M. 35	1 6	
"A.W." Grammo Radio ...	A.W. 40	1 6	
All-purpose Four ...	A.W. 43	1 6	
All-wave Roberts Four and copy of "A.W." ...	A.W. 47	0 4	
C.T. Four ...	A.W. 58	1 6	
Simplicity Four ...	W.M. 49	1 6	
<b>FIVE-VALVE SETS</b>			
1927 Five ...	W.M. 6	1 6	
Two-volter's Five ...	W.M. 11	1 6	
Individual Five ...	A.W. 25	1 6	
Exhibition Five ...	W.M. 33	1 6	
Phoenix Five ...	W.M. 42	1 6	
1928 Five ...	W.M. 46	1 6	
<b>SIX-VALVE SETS</b>			
Nomad Six ...	W.M. 31	1 6	
<b>SEVEN-VALVE SETS</b>			
Simpladyne Seven (Super-het) ...	W.M. 22	1 6	
<b>AMPLIFIERS</b>			
Two-valve D.C. Mains Amplifier ...	W.M. 16	1 0	
Gramophone Amplifier ...	W.M. 32	1 0	
Range Extender (H.F. Amplifying Unit) ...	W.M. 38	1 0	
True-tone Amplifier ...	W.M. 47	1 0	
<b>PORTABLE SETS</b>			
Springtime Portable (Two-valver) ...	W.M. 12	1 0	
Countryside Four ...	W.M. 17	1 6	
Motorists' Portable Four-valver ...	A.W. 14	1 6	
M.C. Three Portable ...	A.W. 42	1 0	
Handy Three ...	W.M. 27	1 0	
Holiday Portable (three-valver) ...	A.W. 32	1 0	
Club Portable (three-valver) ...	A.W. 30	1 0	
<b>CRYSTAL SETS</b>			
Crystal Set for the R.C. Enthusiast ...	W.M. 13	0 6	
Hi-lo Crystal Set ...	W.M. 18	0 6	
Two-programme Crystal Set ...	W.M. 25	0 6	
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<b>MISCELLANEOUS</b>			
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Heterodyne Wavemeter ...	A.W. 7	1 0	
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# RADIOGRAMS



ONE of the recent chief attractions at the Alhambra, Leicester Square, was Joe Termini, of the Kit-Cat Orchestra. He is to appear before the 2LO microphone with his steel guitar and other instruments on January 11.

On January 10, the Newcastle station will divert its listeners with another "lucky dip" programme; portions of the entertainments broadcast by London, Manchester, and Glasgow are to be relayed.

Wish Wynne will be on the ether again on January 20. She is one of the most versatile of stage comediennes, having toured the United States, South America, and South Africa in vaudeville, drama and musical comedy.

Norman Griffen, who appears in a variety programme on the same evening, was a professional architect previous to his stage career. He built houses in those days; now he *brings them down!*

Art Fowler, who recently appeared at the Pavilion, is a recognised champion of the ukulele. He has been "booked" for the variety hour to be broadcast from 2LO on January 10 and 14.

It is reported from Paris that transmissions from the Stamboul broadcasting station have been temporarily suspended, owing to financial difficulties.

A new one-act play, by Netta Syrett, entitled *The Two Elizabeths* will be performed at the Manchester studio on January 2. It is divided into two short scenes and an epilogue. The action takes place in 1650 and again in 1928, and demonstrates that, although times may change the old love-story remains the same throughout the centuries.

To the end of October 1927, the number of registered broadcast listeners in the principal European countries were as follows: Great Britain, 2,347,878; Germany, 1,757,683; Austria, 283,673; Hungary, 74,557; Sweden, 315,906; and Switzerland, 61,804. Although the number of licences issued in Great Britain during

October was only 4,000, the smallest increase in any one month during 1927, there was a remarkable advance in November, totalling 18,137.

On a recent night in France a wireless

## DO YOU KNOW?

1. What is the distance between the grid and anode socket centres in a valve-holder?
2. Also, what is the distance between the centres of the filament sockets?
3. Which station relays the chimes of a famous German castle?
4. Which is the highest broadcasting station in the world?

Puzzle your friends with these queries; the answers will be given in next week's issue of "A.W."

Answers to Last Week's Queries: (1) L'Ecole Supérieure, P.T.T. (2) No. 22 S.W.G. is equal to No. 1 B and S gauge. (3) Birmingham wire gauge. (4) Radio operators' term for the morse-code signature for a comma, consisting of three letter A's.

listener picked up a Sydney transmission which had been relayed by Schenectady (N.Y.), again taken by Munich (Bavaria), and received by him direct from Augsburg!

On January 12 Cardiff will embark on a new venture in broadcasting, namely, a series of "radiologues." This is a new form of story-telling, in which the narrator holds a place analogous to the chorus of the Greek drama, the other characters in the tales supplying the actual dialogue.

Of all stations on the European continent, Zagreb (Jugo-Slavia), without doubt, is the one which mostly indulges in outside broadcasts. Apart from local studio concerts, it also relays entertainments from some twenty different points in the city. On occasions it has taken concerts from Vienna and Prague, as well as performances from Ljubijana (Laibach) and Osijek, and it is now concluding arrangements for the relay of operas from Belgrade. In its immediate neighbourhood, Zagreb is per-

manently connected to three theatres, one music-hall, the cathedral, many restaurants, two football grounds; and the local sports stadium!

A new musical entertainment, entitled *No Song, No Supper*, by Price Hoare, is down for performance at the Belfast studio on January 11. A peculiar stage tradition attaches to this quaint little eighteenth-century opera—that while any other stage meal has always been the work of the property man, in this case the leg of veal which appears in the supper must be the real thing. Will the B.B.C. observe it?

By arrangement with the *Union Internationale de Radiophonie* at Geneva, a further series of international concerts is to be given by the main European broadcasting stations during 1928. February 12 has already been fixed for an evening dedicated to Swedish composers and authors. Provisionally, the series will be given once monthly, namely, for Belgium (March 11), Italy (April 15), Holland (May 6), Denmark (June 3), Switzerland (September 9), Hungary (October 7), Poland (November 11), and Finland (December 16).

In the variety programme arranged for broadcast from the 2LO studio on January 3 will be found the names of Cicely Debenham, the well-known West End musical comedy artiste; Rex Evans; Coram, the ventriloquist; and Esther Coleman.

Both London and provincial listeners will be pleased to hear that the organ recitals previously given by Mr. Reginald Foort, when he was connected with the New Gallery Kinema, London, are to be resumed from the Plaza Theatre on January 4. In future these recitals will take place every Wednesday, from 6 to 6.20 and from 6.45 to 7 p.m., until further notice.

As many listeners spend the Christmas and New Year holidays in hotels or hydros, the Glasgow station will pick up a concert on January 3 from Peebles, one of the most popular Scottish resorts. A special programme for the occasion has been arranged; it includes Dale Smith (baritone), Soloway (violin), May Huxley (soprano), and Stockwin and Partner (entertainers). The programme is to be relayed to all Scottish stations from the ballroom of the Peebles Hydro between 7.15 and 9 p.m.; later, it will include dance music by Ralph Gethic and his band until midnight.

## "THE DORCHESTER BEAM STATION"

(Continued from page 1006)

intercepting messages on their way to Radio House, London, from Rio, Buenos Aires, and New York. Buenos Aires transmits on 15.75 metres, and New York on 22 metres.

### The Super-het Receiver

The receiving apparatus is extremely interesting. As most readers must be aware,

it is difficult to amplify at high-frequency signals whose wavelengths are below 100 metres. The usual procedure is to heterodyne the incoming signal to produce a beat frequency of high wavelength, amplify this through several stages of effective H.F. amplification, and finally rectify it. At Somerton the incoming signals are "super-hetted" to 2,000 metres, passed through a push-pull amplifier of six stages, tuned to 2,000 metres, and the resultant, in an amplified form, is super-heterodyned to a

10,000-metre wave, passed through a 10,000-metre push-pull amplifier, with a further six stages, and thence handed on to a special full-wave rectifier.

### Low Power

Some readers may be surprised at the low powers used in these beam stations. Twenty kilowatts is the usual power rating, and strong, reliable signals are maintained both ways with this comparatively small power.

**“ Remedies ’ that were not Cures ”**  
(Continued from page 1005)

there will not be a big voltage drop across it. But you can do far better than this.”  
“How do you mean?”  
“Any given loud-speaker works best when the output impedance exactly suits it. With the particular kind of cone that you are using I would suggest a transformer rather than a filter circuit. If you ask the makers they will tell you just what is the proper ratio to use. Do you know, comparatively few people realize that to get the most out of any but a high-resistance loud-

speaker it is desirable to use an output transformer? The correct turns ratio often improves reception a hundred per cent.”

“That’s news to me,” said Bradlow. “I certainly will write straight away to the makers of the loud-speaker. Have you any other points to criticize in the set?”

“Quite a number if you don’t mind my doing so. When I looked inside just now I noticed that you had made up your own resistance-capacity coupling units. Before I deal with them I want to ask you what is the value of C8 in your diagram?”

“Point-nought-one. I tried several different values but found that that had the most soothing effect upon screechiness.”

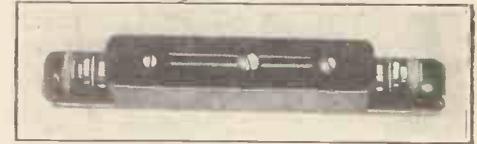
“What you have done actually is to cut down the strength of the high notes, which partly explains why reproduction is so drummy. Using the right output transformer and making certain other alterations which I think will be necessary you will find that C8, if it cannot be eliminated altogether, can be reduced to a very small value. It is not a bit of good, you know, producing what is called mellowness of tone by some people, simply by cutting out the very high pitches. But to go on. It seems to me that the trouble is due very largely to the third valve. These high amplification valves can deal only with a very small grid-swing. Since you have a high-frequency stage in front of the rectifier the grid-swing reaching the third

valve when the local station is being received is considerable and over-loading probably takes place there.”

*Some further difficulties and their solutions will be dealt with next week.*

**L. AND P. VARIABLE RESISTOR : A CORRECTION**

IN our last issue the Test Report on the London and Provincial Variable Resistor was illustrated with a photograph of the



Universal Bracket Company’s Safety Switch, of which a report is given this week. The actual London and Provincial Variable Resistor is shown above. We regret any inconvenience this error may have caused.

The director of Greek Telegraphs, Telephones and Posts has announced that all owners of radio receiving and broadcasting sets must apply within fifteen days to the Ministry of Communications for the necessary licence. Failure to comply will be punishable with seizure of the apparatus, imprisonment up to twelve months, and a fine.

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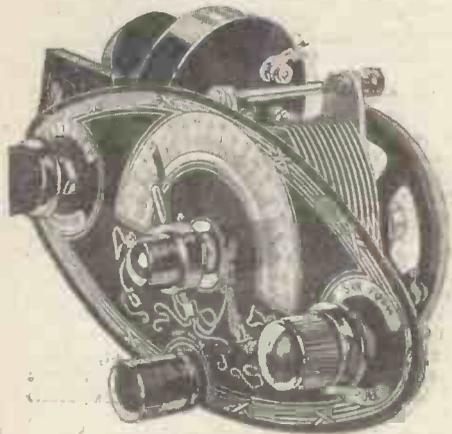
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Of interest to constructors are leaflets received from Hobbies, Ltd., of Dereham, Norfolk on the subject of fretwood, plywood, turnings, wireless cabinets, etc.

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General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or the Publisher, "Amateur Wireless," 53-61 Fetter Lane, London, E.C.4

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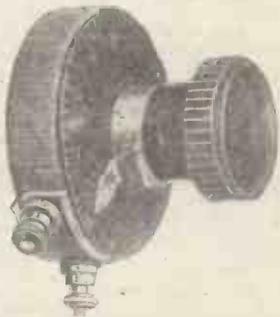
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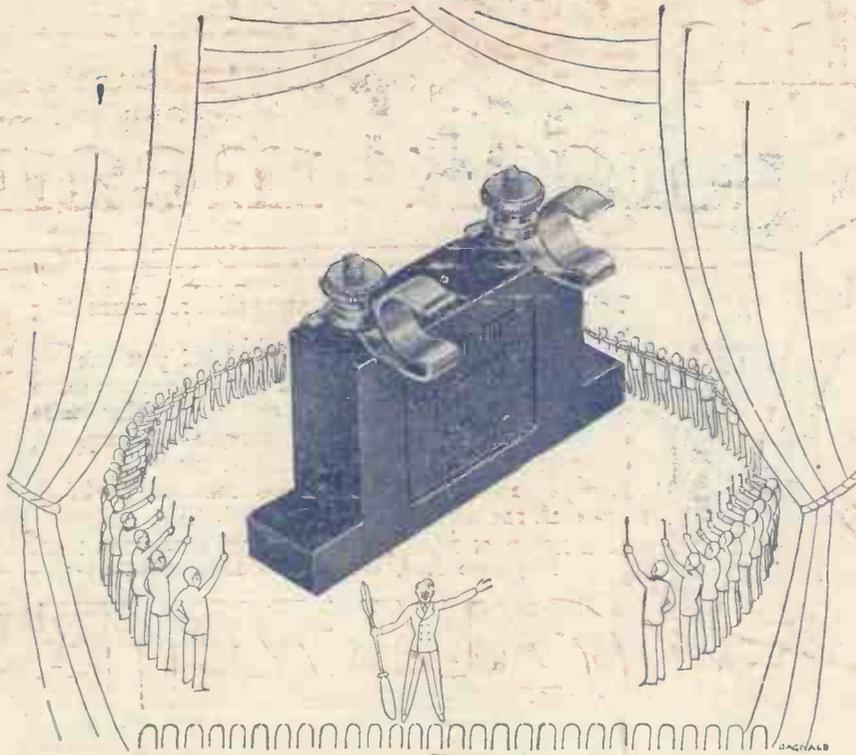
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### DUBILIER DICTA



No. 5.

Many years ago there dwelt on the outskirts of a far-off city an honest merchant. Daily would he sit by the wayside offering for sale unto those entering the city small singing birds.

"Take this bird," he would say, "treat it with kindness, and it will make melody to gladden your city home."



Now it so happened that the fame of this honest merchant spread abroad throughout that land, for the exquisite melody of his singing birds was it not a joy unto all that heard? Moreover, as he charged a fair and reasonable price for his birds, he waxed prosperous.



Then there arose (as there usually does in such cases) a cunning merchant whose name was Haak. He made much study of the honest merchant's ways and, being envious of his prosperity, he sought means whereby he might divert into his own coffers the shekels that fell to the lot of the honest one.



And he caught many sparrows of the city and did colour them to resemble the song birds. And he said that the Alchemists would give much to discover the secret of his dye. And he did take up his stand with his coloured birds farther down the highway, so those entering the city came to him first.



"Who'll buy? Who'll buy?" he piped from the wayside. "Are not my birds cheaper by far?" And many bought who, being deceived by the outward appearance, and attracted by the small cost, believed they were receiving true makers of melody at knock down prices.



And, as they passed on down the dusty road that led to the city, a wry smile played about the lips of the cunning merchant who was named Haak.



Advt. of The Dubilier Condenser Co. (1925) Ltd., Ducon Works, North Acton, London, W.3.

T.C.89