

CAPT. ECKERSLEY ON BATTERIES (See Page 299)

Popular Wireless

Every Thursday
PRICE
3d.

No. 520. Vol. XXI.

INCORPORATING "WIRELESS"

May 21st, 1932.

BUILD THE OUTDOOR THREE

See
Inside

OTHER SPECIAL FEATURES THIS WEEK:
DECOUPLING FOR YOUR SET
ALTERING AERIAL INPUT
THE SIDE-BAND STRUGGLE

By VICTOR KING.

HOW WIRELESS DID ALTER HISTORY—(II)

By Lt.-Commr. The Hon. J. M. KENWORTHY, R.N.

Buy all your radio from the
world's largest distributors

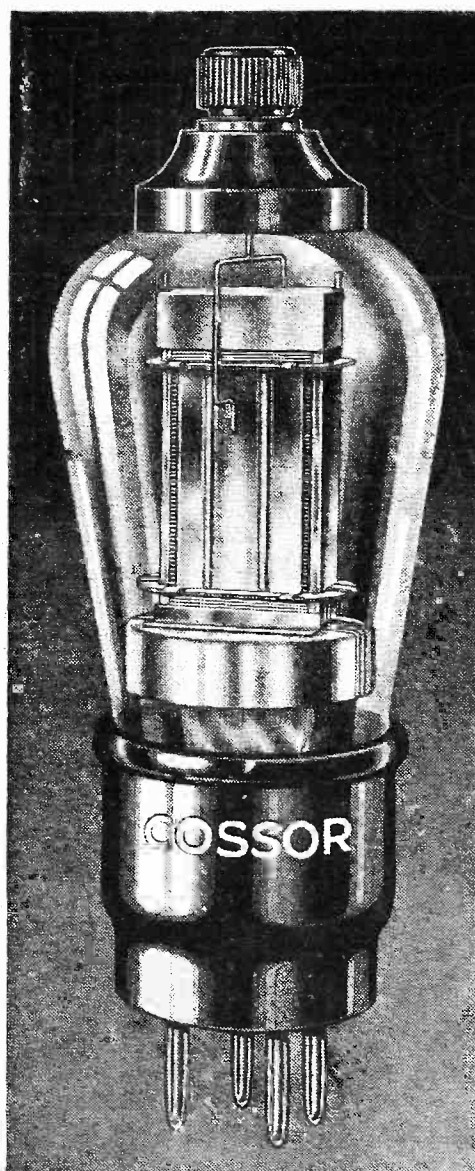
Ready Radio

Eastnor House, Blackheath, S.E.3

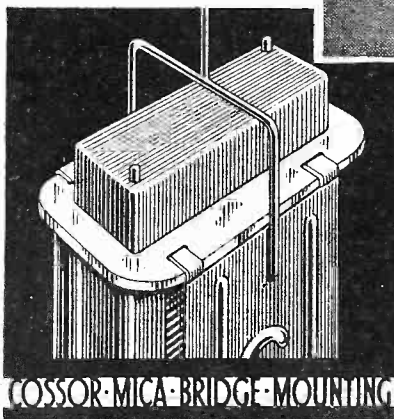
High Effective
Amplification

Exceptional
Sensitivity

Inherent
Stability



A copy of the 72 page Cossor Wireless Book B11 will be sent you free on application to A. C. Cossor Ltd., Melody Dept., Highbury Grove, London, N.5.



Get one of the new Cossor Station Charts price 2d. Ask your dealer for a copy of this useful novelty or write to us enclosing 2d. stamp.

THE COSSOR MICA BRIDGE IS RECOGNISED AS ONE OF THE MOST OUTSTANDING CONTRIBUTIONS TO VALVE DEVELOPMENT OF RECENT YEARS

THE abnormally low inter-electrode capacity of Cossor Screened Grid Valves (of the order of .001 micro-microfarads) ensures a remarkable degree of stability as a result of the virtual elimination of capacitive coupling within the valve. Thus, the valve's capabilities may be fully realised in actual practice resulting in exceptionally high stage gain and extraordinary sensitivity. Battery types price 16/6, A.C. Mains types 19/-.

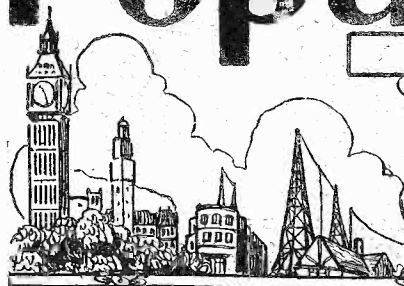
COSSOR
ALL BRITISH
SCREENED GRID
VALVES

A. C. Cossor Ltd., Highbury Grove, London, N.5.

Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Dublin.

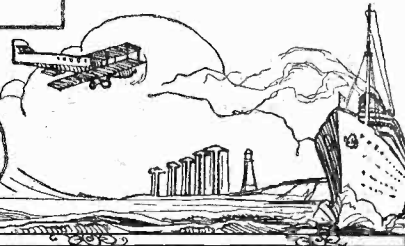
Popular Wireless

LARGEST NET SALES



Scientific Adviser:
Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.

Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.



**JUST THINK!
THE GANGSTERS
ARIEL'S DEBATE
CONSTRUCTIONAL**

RADIO NOTES & NEWS

**A NOVEL IDEA
AFRICA SPEAKS
OUR CAT
BEDTIME STORY**

The Spring Contest.

IT is just about now that there begins the annual contest between radio and the garden. Slugs woo me from the dial to the salt-cellar. The lady of the garden points out that if the gladioli don't soon get planted they will flower on the day that we leave for the seaside. And the lawn wants to be mowed. So I sadly switch off and prepare myself for the rude labours of the horticulturist.

If anyone can destroy weeds in a lawn by radio I will invest untold gold in his patent. All my clumsy attempts to destroy daisies and dandelias by means of chemical poisons serves but to stimulate the growth of those plants. S.O.S.

Just Think of It.

STATISTICS from America show that at least every other American home has a radio set. Doubtless the other half are looking for work, because the U.S.A. has so cutely cornered most of the world's gold in its safe deposits. I myself would not exchange all the gold which America has taken from Europe for an acre of English ground and a cottage on it.

There is more human joy to be derived by an Englishman from an English marrow than from all the feverish American continent.

The Radio Relay Business.

I USED to give regular news of the progress of the "radio relay" enterprise, because I felt that it is a business which supplies a necessity and has a big future awaiting it. Besides, I thought that an attempt was being made to scream it down. However, the thing grew too big for my little bulletins, but I may say that some 120 radio relay exchanges are now working, with a total of about 50,000 subscribers.

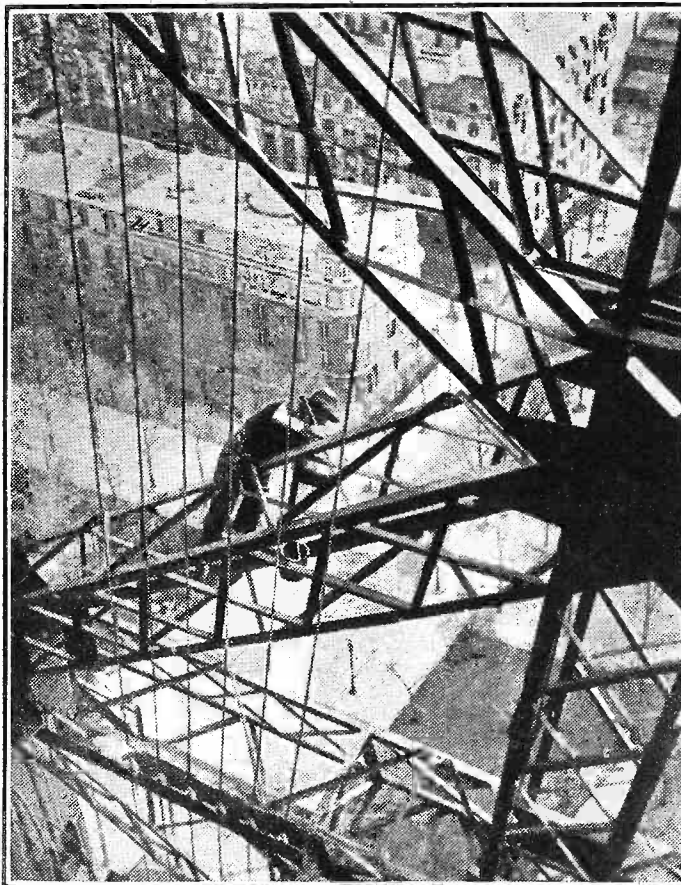
Have the Gangsters Really Arrived?

IT would seem so, indeed. A Manchester firm who were offering radio receivers at specially reduced prices, as salvage stock, has received the following warning in an unstamped envelope:

"Close this shop within one month or you will stand the racket. You are a danger to other business. Your firm will suffer same as Blackpool if you don't. 1st Warning."

The firm's shop in Blackpool had been burnt down! If this sort of thing continues we shall have to pipe down a bit when we poke fun at the U.S.A.

EIFFEL TOWER'S SPRING CLEAN



Paris has decided that the famous Eiffel Tower deserves a new coat of paint, and here is a picture of French roof tops and of one of the workmen with his paint-pot and big brush. The Eiffel Tower transmissions go out on a wavelength of 1445.7 metres.

My Radio Advertising Debate.

THIS, as you may recall, is between me and W. W. of San Diego, California. We exchange a wallop about every quarter. Bill's latest is to ask me why, if radio advertising does not pay, "stone-

hearted Britishers" advertise gramophone records over European stations. That, my dear old Californian, is an exceptional instance and gets you nowhere. In these programmes the advertising matter is not spoken boosts of goods, but the broadcasting of the records themselves. If the listeners like one of the records some of them will probably buy it; they wouldn't buy a record of a bit of dance music, however, if the makers paid an orchestra to play some of the finest music extant.

A Voice from America.

WELL, have it your own way! Let's change the wave-length and tune-in your own Dr. Lee de Forest, mis-called "the father of broadcasting." As reported in Canadian papers, he told the Canadian Radio League: "We find [in America] to-day, radio broadcasts given over largely to dull salesmanship, its music insistently interrupted by staccato announcement, its 'Old Sweet Song' crooningly degraded."

"Paying nothing to the people's government for their priceless franchises, these etheric squatters continue to mar imaginable highlands of beauty with gargantuan signboards. Culture and education have been shouldered out." And lots more of the same kind. Well, if the U.S.A. stands for it, there's only one explanation possible—it *pays*!

News of the "P.P.E.3."

I SELECT a pretty letter from many which have tumbled in about this fine set, to wit, that of W. F. B. (Cardiff). He thinks that his results are "perfectly splendid," and he has tuned in "no less than 40 foreign stations," without interference, and with perfect clarity. Sir, we thank you and so would P. P. E. if he were here—which he is not, being off to "furrin" parts at the moment.

(Continued on next page.)

ALTERING AERIAL INPUT

An article which tells you how to increase the programme-pulling powers of your set at times when the B.B.C. stations are not working.

By FRANK BRIGGS.

IN these days of high power and closely crowded stations the cry is for more and more selectivity. But it is a well-known fact that as the selectivity is increased, the H.F. input (for a given transmission) to the first valve is decreased. The amount of this decrease, of course, varies with different types of circuits. But nevertheless it is there.

A simple illustration of this can easily be effected by joining a small capacity variable condenser, about .0001 mfd., in series with your aerial, and noting the effect as the capacity is gradually reduced. As the knob is turned towards the minimum position the tuning of stations will become sharper, but at the same time their strength will be reduced.

In many cases this reduction is no disadvantage, for it is better to receive a distant transmission at only moderate

Many commercial receivers are provided with two or more aerial terminals to suit the selectivity requirements of various localities. And in this short article I propose to outline a method whereby this scheme can be applied to home constructed sets.

The Alternative Connection.

Fig. 1 shows the essentials of a detector circuit employing the famous "P.W." dual-range coil. When this well-known coil is used the aerial is coupled to the tuned grid circuit through a small untuned inductance. The size of this coil was chosen to meet average conditions, and in most cases it will want a lot of beating.

Now if you look at this particular circuit again you will see that a second aerial arrangement is possible. It can be connected direct to the top end of the grid coil through a small variable condenser. (The connections are shown dotted so as not to confuse them with the ordinary wiring.)

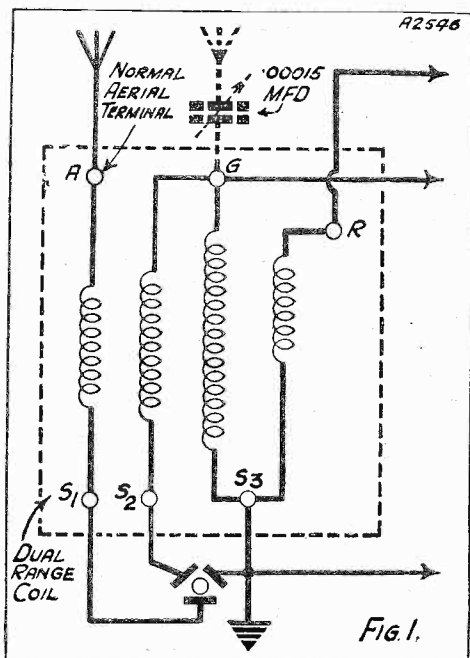
This is purely an addition, and there is no need to alter any of the normal connections. On occasions when the full selectivity is not required, such as those mentioned previously, the aerial can be joined to this additional terminal. This has the effect of bringing the aerial on to the tuned circuit and enabling tighter coupling to be obtained.

Value of Series Condenser.

The condenser should have a capacity of about .00015 mfd., or in cases where a small outdoor or indoor aerial is used it could be very well increased to .0003 mfd. With an average P.M.G. aerial about 70 feet long a condenser of the first type would be better, with the vanes about halfway in.

At times when interference is not bad, such as when the British stations have closed down, connecting the aerial in this manner will improve the pulling powers of the set tremendously. The exact setting of the series condenser will have to be found by experiment; but, after all, this is not a very difficult job.

IMPROVING LONG WAVES



If you have an old dual-range coil in your set, and you want a little less selectivity but more volume on medium waves when the B.B.C. stations are not working, try shifting the aerial lead as indicated above. This arrangement often has the effect of improving long-wave results as well.

strength than have the receiver adjusted to its most sensitive condition and get half a dozen programmes at once. There are, however, certain circumstances in which extreme selectivity is not required.

When the Ether is Quiet.

Take, for instance, the before-breakfast period. Not that there are many readers who indulge in "knob twiddling" at this hour, but doubtless there are a few.

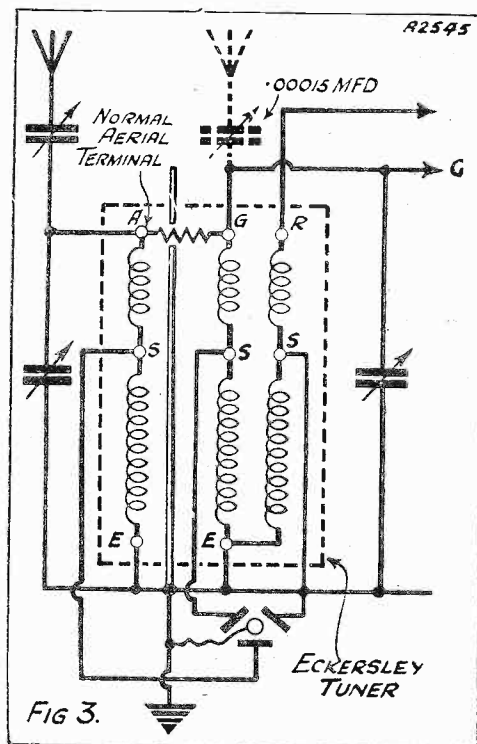
Then there is that peaceful period on Sunday mornings when all good station engineers are at church. And last, but by no means least, there is the listener whose "local" is fifty miles or more away.

This scheme can be applied to almost any coil on the market, the exceptions being those that have already adopted it, and Fig. 2 illustrates how it could be done in the popular P.J. and P.V. series. Then in a few cases it might even be tried with Captain Eckersley's well-known tuner. This is clearly shown in Fig. 3.

About the Dial Readings.

There is one slight disadvantage to the scheme from the ordinary reader's point of view, however. That is, that as soon as the aerial is shifted over to the extra terminal, stations will not be found at their usual settings on the dial. This is due to the extra load created by the aerial, and as a general rule it will be found that the readings will be slightly lower. But the more the series aerial condenser is reduced in capacity, the nearer these readings will be to normal.

EASIER TUNING



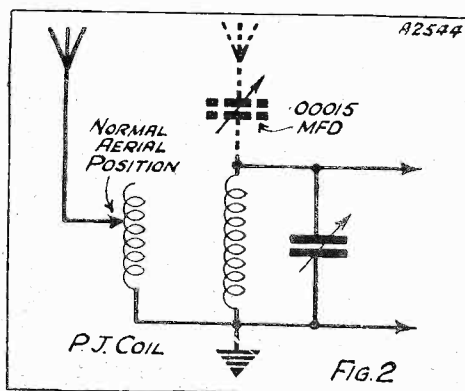
Perhaps you have an Eckersley Tuner in your set. The idea can be applied to this coil in exactly the same manner, as shown in the above diagram. It will give you more volume, and also broaden the tuning which is sometimes useful if interference is not too bad.

All the foregoing remarks apply principally to reception on the medium wave-band, and although it may not always be so, it will generally happen that on the longer waves the normal method of connection will give better results. This is because of the higher impedance offered to the lower frequency currents by the small series aerial condenser.

Don't get these series condenser arrangements mixed up with that mentioned in the first part of this article. In that case the aerial was still connected to the normal aerial terminal, and serve only to illustrate how the volume was decreased as the tuning was sharpened.

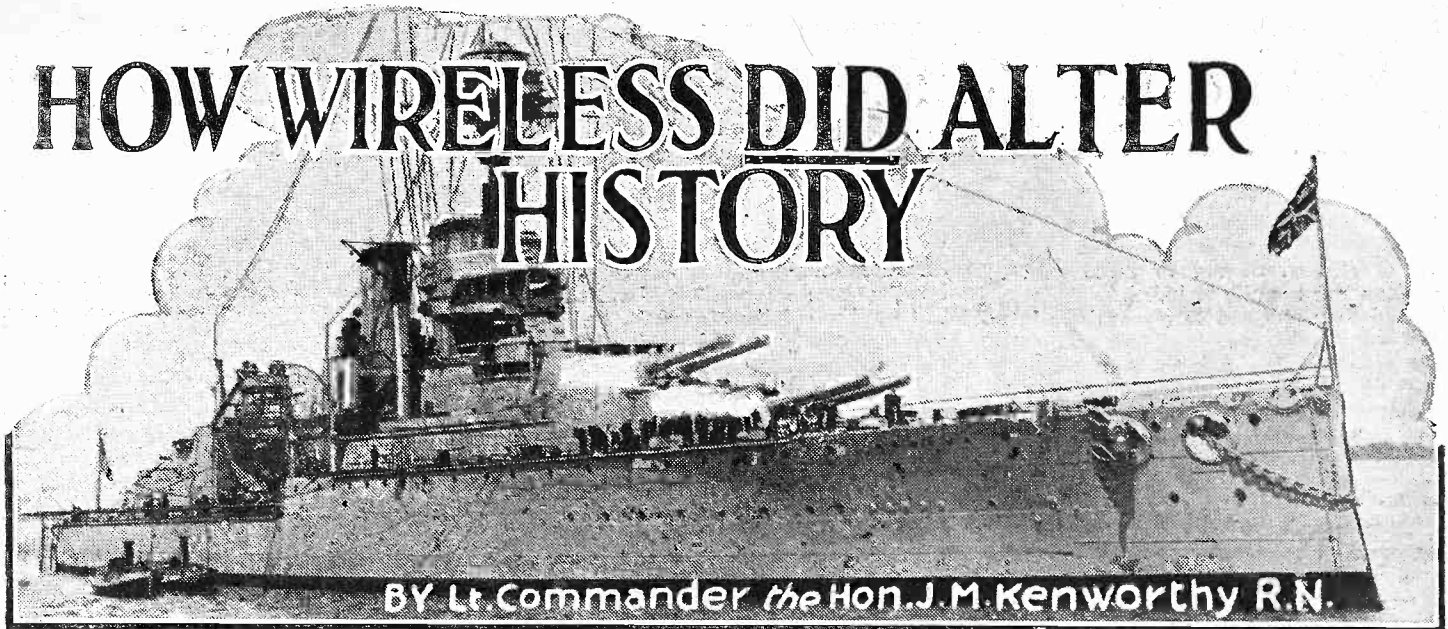
In the schemes suggested here, the purpose of the condenser is to reduce the capacity of the aerial, so that it will not upset the tuning range of the coil to any great extent. The input is bound to be a little less, but this is made up for by connecting it to the top of the grid coil.

MORE VOLUME



This shows how the same scheme as Fig. 1 can be applied to the famous P.J. coils. Just move the aerial lead to the top of the grid coil, through a small variable condenser, and you will be surprised at the difference.

HOW WIRELESS DID ALTER HISTORY



BY Lt Commander the Hon J. M. Kenworthy R.N.

IN the previous article I described the wonderful secret work, for the most part even now unknown to the world at large, of a team of professors and scientists in worming out the secrets and discovering the keys of the wireless codes and ciphers of our opponents in the Great War.

But apart from this wireless blockade, for it amounted to this, the use of the ether played a great part in the campaign. Wireless led directly to the destruction of the cruiser "Emden."

Dodging the Patrols.

This notorious destroyer of commerce on the trade routes managed to escape from our cruiser patrols for some weeks at the beginning of the war, during which she wrought great havoc among unarmed merchant ships flying the flags of Britain and her Allies.

She was well handled; and in the vast stretches of the Pacific and Indian Oceans it was like looking for a needle in a haystack to try and locate her. The "Emden" coaled and obtained provisions among uninhabited islands from collier-transport and store ships sent to these secret rendezvous on a preconceived plan.

An S.O.S.

How long she would have remained at large it is impossible to tell. But her Commander made the mistake of attacking the lonely Cocos Islands in the Pacific. Here was a British wireless station, and the operator, although being bombarded, sent out his S.O.S.

Unbeknown to the "Emden" a con-

In his final article Lt.-Commander Kenworthy reveals, for the first time, how narrowly friction between the U.S. and Great Britain was averted by radio during the Great War. He also describes the parts played by wireless in the North Sea Campaign and in the combating of German Armed Cruisers and Zeppelins.

voy of Australian troopships bound for Europe was within less than a hundred miles. It was escorted by a couple of Japanese warships and the Australian cruiser "Sydney." The S.O.S. was read and the "Sydney" dispatched with all speed to the

Islands, clearing for action the while. The "Emden" saw her coming, and made off as fast as her engines could drive her. But the "Sydney" had the legs of the German cruiser, caught up with her, and destroyed her with gun-fire.

So ended the career of this raider, encompassed by a wireless signal.

Radio Saves the Situation.

Of the general use of wireless in the Great War it is unnecessary to say much. Its utility is generally known. But one or two unusual episodes demonstrating its value will be of interest.

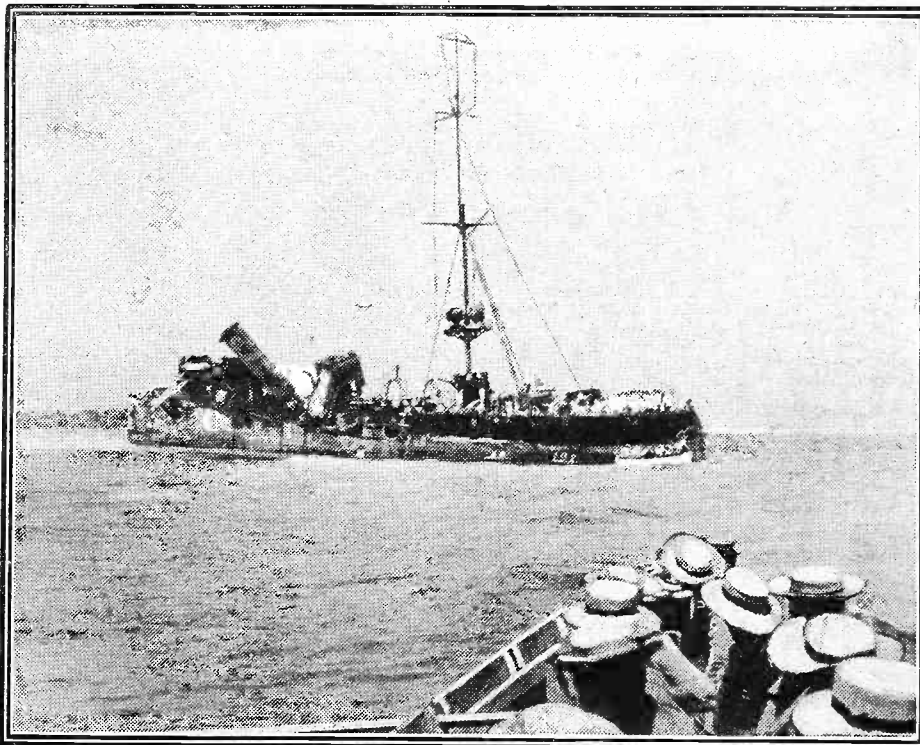
And in one of these episodes it lessened the danger of bringing America into the war, not on the side of Britain, but against her, because of the irritation felt at our blockade, and the damage it inevitably caused to American trade. For our blockade started at once, but the illegal and violent submarine blockade by Germany only commenced later in the war.

Opinion Changes.

Before Germany resorted, in desperation, to unlimited submarine warfare against merchant shipping, and alienated American opinion by sinking steamers flying the Stars and Stripes with torpedoes without warning, and drowning their American crews, there was much friction between Great Britain and the United States over our more regular and legal interruption of supplies useful for war purposes to the Central Powers.

More than once relations were so

THE END OF THE EMDEN



One of the most noted of the German raiders after having been battered into impotence by the Australian cruiser "Sydney." Wireless led directly to this victory, as our contributor shows.

(Cont. on next page.)

HOW WIRELESS DID ALTER HISTORY

(Continued from previous page.)

strained that there was a real danger of the United States declaring war not upon Germany but upon Great Britain. United States citizens desired to trade with all nations, our enemies included.

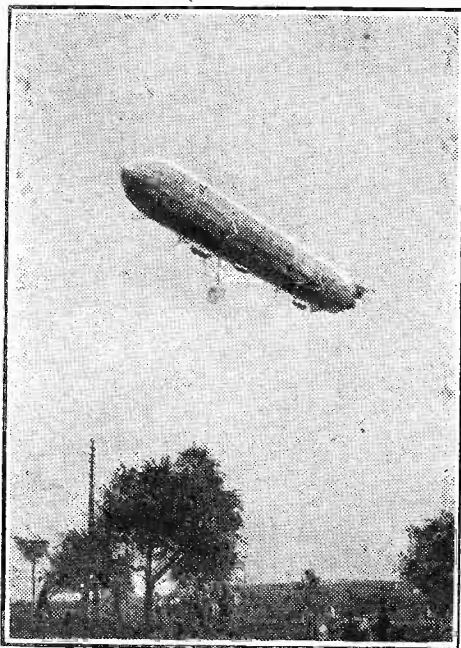
And they objected to our cruisers interfering with this trade. Cotton was one of those border-line commodities which we desired to treat as contraband but which the Americans, and the Southern States in particular, maintained was an ordinary raw material of peaceful commerce.

A Bright Idea.

In August, 1915, matters were nearly brought to a head by the dispatch of a steamer loaded with cotton from the United States to Bremen. If a British cruiser had seized her, every pro-German propagandist on the other side of the Atlantic would have shouted aloud. If we had let the ship go, she would have been followed by a fleet of others, and our blockade broken.

But there was warm sympathy for France in the United States. And the name of Lafayette was, and is, one to conjure with. So we hit on a bright idea. A French cruiser, fortunately called the "Lafayette," was attached to the tenth cruiser squadron operating between Scotland and Norway, and holding up all traffic for Germany.

THE RAIDER



A German airship crossing East Anglia on its deadly mission—the bombing of London.

The plan was to have the cotton-ship arrested by the "Lafayette" flying the beloved tricolour. But how to ensure this? The cotton-ship would be lost once she had cleared New Orleans, and we dare not "shadow" her. Wireless came to the rescue.

On the cotton-ship approaching the patrol line off Norway a signal was sent to the "Lafayette" ready waiting among the Shetland Islands. The English cruisers allowed the blockade runner through without interference, but only to be intercepted

by our French ally to be taken before a French Prize Court. The great propaganda plot failed. The danger was past. Without wireless this arrangement could never have been carried out.

I must conclude with a description of the directional wireless stations and the part they played in the North Sea campaign.

A directional station, picking up a signal, can tell, within a degree or two, the line on which is the sending ship or station. Another direction-finding station can calculate the bearing from its position simultaneously. The two lines of direction plotted on a chart will show the exact position of the sender of the signal at the point of intersection.

For this reason, and knowing that our opponents had directional wireless, and also might be able to decipher our signals, the "silence" signal used to be made whenever the Grand Fleet went to sea. No wireless was allowed to be used except in case of emergency such as the sighting of enemy warships by a detached cruiser.

Locating the "Zepps."

When the German Zeppelins were flying to England to bomb our towns they could check their positions by making a signal which the German stations would pick up, calculate the position of the airship, and transmit it back to the Zeppelin commander.

But so could our wireless directional stations! They used to receive the "position signal," too. And they would pass on the information, obtained after plotting the Zeppelin's position on a chart, to our fast interceptor squadrons of fighting aeroplanes waiting ready on their shore aerodromes. Several Zeppelins were successfully located in this way, and eventually the Germans decided that it was too unhealthy to send any more.

In the same way, if German warships used their wireless apparatus at sea our directional stations could calculate their positions. And we could read their signals, too, as already described. Thus it was that the presence of the German battle-cruisers at sea was discovered prior to the Battle of Jutland.

Now the Germans played a trick on this occasion. Suspecting the efficiency of our Wireless Intelligence Service, they transferred the call-sign of their High Sea Fleet Flagship, a super-dreadnought battleship, to a small gunboat lying in the Jade River near the flagship's usual mooring place.

Deceiving Our Direction Finders

The gunboat made signals at intervals and led us to believe that the German flagship, and therefore the German battleships, were still in harbour and that the cruisers were at sea by themselves.

When Admiral Beatty engaged the German cruisers in the historic action, he did not know that the German main fleet was near at hand. Fortunately, on this occasion, the Grand Fleet was also at sea and was informed by wireless of the preliminary cruiser engagement.

Admiral Jellicoe hurried up with the Grand Fleet, and it was now the German Admiral's turn to be surprised. For he suddenly found himself heading straight for the middle of the more powerful British Battle Fleet. Mist, smoke, torpedo counter-attacks and gathering darkness enabled him, it is true, to escape destruction.

But the High Sea Fleet never went to sea in battle array again over towards our coasts.

REVIVING AN OLD CIRCUIT

A READER'S EXPERIENCES

The Editor, POPULAR WIRELESS.

Dear Sir,—The article by Captain Eckersley on band-pass tuning, plug-in coils, peak-tuning and quality, so bears out my own experience that I cannot resist the temptation to "write to the press" (as represented by POPULAR WIRELESS) about it; and if, incidentally, it enables interested readers to obtain the step forward in the search for selectivity, volume and quality which so many desire, my "writing to the press" about it will not have been in vain.

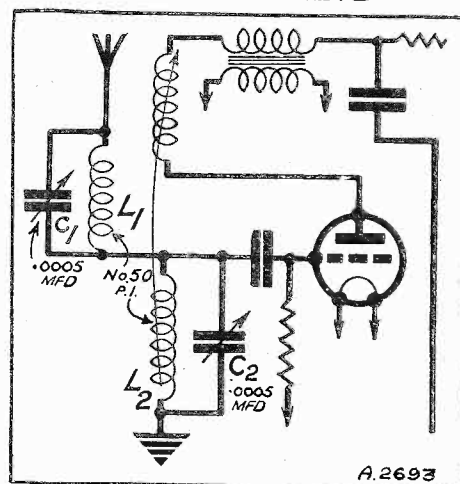
I use a straight three with plug-in coils, the detector being decoupled with the usual resistance and condenser. The transformer leading to the second note-mag. connected up "parafeed," and a large metal plate fixed to the top of my radio table (in turn covered by cartridge paper and then a fancy cloth to camouflage it) is connected to earth.

Having thus "tied the brute down," I then have matters so arranged on the side of the set nearest the lead-in that I can use aperiodic coupling (just four turns tied to the grid-coil), so that I can tune the aerial system by means of an inductance, so that I can use a simple tuned circuit by clipping the lead-in on the top end of grid-coil, so that I can auto-couple by clipping the lead-in on a terminal which goes to a tapping on the grid-coil—in fact, the whole contraption is so flexible that I can try out almost anything one could reasonably desire.

Now, as Captain Eckersley very truly states, you have to "learn to handle" such a set—you have to "learn to play on it" just as a musician learns to play on an instrument. If you want to get the best out of your own particular outfit, it is perfectly ridiculous to get fed-up and say "the set won't do it." Your set may be excellent and, perhaps, all the time it is *you*. Then, again, a flexible outfit calls for a flexible mind in the noddle of the operator, and this latter is a very important point, because we are so apt to condemn what appears to be a defect when it might be a stepping-stone in the right direction if utilised.

This being the case it may be interesting to consider how a very, very simple and apparently defective circuit may be used and be productive of rather surprising results:

PEAK TUNING



Mr. Vass obtained excellent results with this simple circuit.

At first sight we may expect C1 and L1 to constitute nothing else but a poor form of wave-trap, which simply confuses us by shifting about the peak tuning-point on C2. Quite so! But what of it? Why not utilise it? How? Well, if by increasing C1 you shift the peak tuning-point of the longer wave interfering local lower down the dial of C2, then on the top half of C2 stations from about Toulouse or Sottens up to Vienna or Budapest may be tuned in with the minimum of reaction (just keep her gently breathing) one after the other at good volume and with good quality. Then, by reversing the process, decreasing C1 until the shorter-wave interfering local has its peak tuning-point well up C2, we can go "on tour" round the lower half of C2, and that flat tuning we used to hit up against in the case of the shorter-wave local has disappeared!

The beauty of it is this—that once you have set C1 so as to leave a given half of C2 free from interference, there is then *genuine one-dial tuning* on C2 and no bunk about it, because there is no further need to touch C1.

Sincerely yours,

ERNEST H. VASS.

Kennington Cross, S.E.11.



The SIDE-BAND STRUGGLE

by VICTOR KING

AT this very moment, rival factions of radio experts are engaged in a bitter struggle; although, in the main, the arguments are so academic that there is not much "meat" in them for the layman.

The war is being waged in the highly technical press, and one cannot help concluding that some fair proportion of the verbiage is pure pedantry.

It rather reminds one of the story of the two nineteenth-century professors who were fiercely arguing in a railway carriage as to whether certain microscopic particles, known generally as diatoms, were animal or vegetable in nature. For over an hour the worthy scientists simply boiled over with "isms" and "idiums," each trying to batter the other into submission by sheer weight of abstruse words. Finally, one of them turned to the third passenger in the compartment, a stranger who had been listening with puzzled awe, and said: "Surely *you* can see, sir, that I have convincingly proved that the diatoms belong to the Vegetable Kingdom in that I show —" (and here followed a stream of technical data).

The third passenger wrinkled his brows.

What Did it Matter?

"Did I understand you to say as how these what-you-call-'ems is so small you can't see them without a microscope?" he asked.

"In many cases they are invisible to the naked eye," agreed the professor.

The third passenger thought awhile, and then delivered his considered judgment in the following words:

"Well, good sirs, if these things what you are argufying about is so small you can't see 'em, it stands to reason you can't eat 'em, so I don't see as how it matters whether they is vegetables or animals!"

And, if I had been there, I should have felt like saying "Hear, hear!" I'm not denying that there is great value in scientific controversy even in regard to abstract principles, but, all the same, I reserve my hat-lifting for that quiet kind of worker who disappears into a "hut on the moors" for a few years and then emerges with a new theory or a new discovery or a new technique, rather than for the hordes of vocal scientific publicists who will leap from their library chairs to try and tear it to bits.

These scientific wolves have two general methods of attack. One is to endeavour to disprove the originality of the idea or

An absorbing article by a popular contributor, with a long P.S. by "P.W.'s" Technical Editor. Is it another of those Dowding-King arguments? Well, Victor says of an inventor he mentions: "But in advancing his claims he asked for, and got, the inevitable criticism, disparagement . . . and even derision! Some said the idea was as old as the hills, others that theory plainly showed it was impracticable."

On the other hand, G.V.D. gives it as his opinion that:

"If anyone has the temerity to suggest he has invented something which 'smashes existing practice,' then he must expect responsible scientists to tear the so-called 'new principle' to pieces in search of snags. That's their job, for they are the public's guardians against irresponsible claims which by their mere existence are liable further to ruffle the already troubled waters of economic progress."

So it does seem that THESE two experts are not quite in full agreement!

scheme, and the other to try and prove it is wrong or can't work.

We have many illustrations of both methods in the latest radio controversy. But many of you won't have the faintest idea as to what the "bone of contention" is, so I had better explain it.

A broadcasting station occupies more than one definite wave-length of ether space. Although the London National transmitter is officially listed at 261.6 metres, it is unable to confine its programme to just that wave-length.

In actual fact, it spreads a little above and a little below.

Side-band Spread.

The spread is occupied by what are called side-bands, and the wave-lengths of these bear a direct relation to the 261.6 metres. They are caused by the modulation of the carrier wave by speech and music frequencies.

If you could reduce this side-band spread you could squeeze more stations into a given band of wave-lengths, but you cannot do so merely by making a transmitter more selective, as it were, for that would merely

result in cutting off speech and music frequencies.

But even when broadcasting stations are given tiny bands of wave-lengths to themselves, as at present, it is still difficult to prevent their side-bands overlapping for various reasons. For example, it is impossible to allocate anything but meagre bands to the individual stations and, what is more important, it is difficult to keep every station in its own band.

It has been proposed that a radio receiver should be made extremely selective and the loss in speech and music frequencies that results by so doing compensated for by tone correction.

The system has its strongest modern advocate in Dr. J. Robinson, whose Stenode is by now quite well known.

He claims that his Stenode is so selective that it hardly takes in any side-band wave-lengths at all, and yet he achieves good quality by intense L.F. compensation.

Disparagement

But in advancing his claims he asked for, and got, the inevitable criticism, disparagement—and even derision! Some said the idea was as old as the hills (comparatively speaking!); others, that theory plainly showed you couldn't carve off side-bands in such a summary fashion without ruining the quality of reception. But after demonstrations these latter altered their tune slightly and grudgingly admitted that passable results might be obtainable, but "look at the complexity of the apparatus—the difficulty of keeping broadcasting stations sufficiently steady in regard to their wave-lengths, so that they didn't wander in and out of the knife-edge Stenode tuning," etc.

The arguments have been going on for nearly two years now, and one wonders for how much longer they will continue!

I suggest it would be fairer to assess the value of such innovations mainly on their practical merits. If a man claims he can do something with new apparatus he has invented, I would invite him to give a practical demonstration.

If this were successful, then the next step would be to examine the apparatus for such qualities as reliability, economy, and so on.

Criticism of a purely academic nature ought to be punishable by law, for it has been the cause of killing the enthusiasm of countless inventors and the repression of innumerable brilliant ideas!

(Continued on next page.)

The Side-Band Struggle

THE OTHER SIDE OF THE PICTURE

A postscript by
G. V. DOWDING, Associate I.E.E.
(Technical Editor).

Mr. Victor King's readable article lucidly expounds some very popular sentiments, and in joining issue with him, I am quite aware that I am inviting the wrath of innumerable correspondents. However, he has given me the excuse to record in print certain definite views I hold, and I am going to seize the opportunity and take the consequences!

Reading between the lines of his contribution, one has no difficulty in discerning that his *motif* is the championship of the "struggling inventor." But it is my opinion that, in reality, the "struggling inventor" belongs to the nineteenth century, although he still lives in fiction and the press.

Worth-while discoveries and inventions do not emerge from "huts on the moors" or from garrets these days, but are born in well-conducted laboratories: and, if there do happen to be isolated exceptions, then these are merely the exceptions which prove the rule.

The reason for this "promotion" of invention is plain. At the beginning of the scientific industrial age in which we are now living, way back in the middle of the nineteenth century, or even earlier if you like, there was everything to find out and very few qualified scientists and technicians engaged in the finding.

Scientific Pioneers.

But, even so, remarkably few great scientific discoveries or inventions can be credited to "laymen." Your Lodges, Maxwells, Fessendens, Einthovens, Eversheds, Ferrantis, etc., were all skilled engineers and scientists (I confine my arguments to electricity and radio because I can claim to know a good bit about these).

It is true that the majority of these pioneers had great difficulty in convincing their contemporaries of the value of their work, but the same tardiness of recognition is not, in my view, the lot of the modern research worker and inventor.

It is my experience that modern men of science and industry are only too willing to listen to anyone who says he has something new to impart or show. And I use the term "too willing" advisedly, for there are times when one is amazed at the gullibility of men whose scientific training should have taught them better!

There are, it is true, minor mathematicians who seem to delight in destructive criticism, but no one pays much attention to them.

Open discussion and constructive criticism are all to the good, and an inventor should welcome them if he has the courage of his convictions.

And now let us take a quick peep back into the history of radio. What are the great radio inventions of the past twenty years? The three-electrode valve stands out, and then there are, perhaps, neutralising and the screened-grid valve. But these were rapidly absorbed—and you can find no picture of a "struggling inventor" fighting for his just dues there; rather is there a vague picture in one's mind of

wealthy scientists fighting patent actions in the high courts!

Leaving aside great inventions, what of the hordes of very useful minor inventions which accompany the development of radio like a cloud of locusts? Looking through my patent records I find that the vast majority of these are due to well-known industrial corporations, their employees, and independent but well-known engineers. I fail to see many unknown "Harry Smiths of Tooting" and "Jim Joneses of Bradford" in the lists!

But what exactly constitutes an invention? I fear the popular idea is that it is merely an elaborate excursion into ingenious mechanics. An "engine" of complicated construction which will do several jobs at once seems to be the best candidate for newspaper honours in invention.

MARCHESA MARCONI



A charming new portrait of Marconi's wife.

The blunt truth is that any engineer with the slightest imagination can fashion weird and wonderful instruments, but he knows, or ought to know, that although they may have novelty appeal, their intrinsic value to the public and the industry which serves it will be mighty small if they can claim no other qualities.

On the other hand, the radio industry is able to absorb worth-while ideas almost as quickly as they come along.

During my ten years as Technical Editor of POPULAR WIRELESS I have received the confidence of hundreds of would-be inventors, but it is notable that I have not yet encountered one who had anything valuable to sell. I never rely only upon my own judgment in such matters. Even though an idea seems to me to be quite hopeless, I always, with the inventor's ready consent, pass it on to one of my trade friends, and I have many who are just as eager as I always am to find something that is really worth-while in the way of a new radio gadget, idea or system.

The Inventor's Viewpoint.

There is little demand in this modern age for things that are merely spectacular, or have nothing but mechanical ingenuity to warrant their claim to "newness." But there is an assured welcome for devices

which will do their work better and cheaper than anything else of a like nature.

Let me now write as an inventor in order to illustrate the truth of all this. During the last fifteen years, I suppose, I have taken out well over one hundred patents.

The first thirty or forty are mainly of a highly ingenious nature, and I well remember how I used to burn with indignation when they were turned down, nearly all of them, by what I considered to be "blind, unimaginative men of business."

But I didn't know as much about such matters as "costs of production," "public demand," etc., as I do now. It seemed inconceivable to me then that merchant princes did not cluster round me like flies and fight for my "brilliant" ideas!

My latest invention (patent applied for less than six months ago) is easy to produce in mass-production and simple in conception. But, and these facts are right to the point, it does do something which no single device could do before, something which the public wants done, too, and it can be sold cheaply. Result, there was no need to hawk the idea round—I was able to pick my manufacturers. I mentioned it almost casually to them, they immediately snapped it up and within two weeks the device was on the market selling like smoke.

I don't claim either that it is a "marvellous invention," or that it was the result of inspiration. But it has cost me a proportion of the hundreds of pounds I've spent on patents before learning what constitutes a "commercial" invention.

Its catalogue price is under ten shillings, and I have no bitterness in my heart against the public for not more readily lapping up my last-but-thirty (I think it is about that) idea—the first and still, I believe, the most ingenious, spectacular and best home talkie! The public has a right to know what it wants!

An Actual Example.

I, too, have experienced the peculiar honour of being the centre of scientific discussion the world over in respect of a "new principle," but I look back at that as one looks back at one's first circus or pantomime. Anyway, what I say is, if anyone has the temerity to suggest he has invented something which "smashes existing practice," then he must expect responsible scientists to tear the so-called "new principle" to pieces in search of snags. That's their job, for they are the public's guardians against irresponsible claims which by their mere existence are liable further to ruffle the already troubled waters of economic progress.

Here is an example of what has actually happened. When television was widely announced as "here at last" in the United States, the sales of radio receivers fell off alarmingly, for the public decided to buy no new ordinary sets, but to wait for "television" models. If they had continued to wait the radio industry in the U.S. would have been at a standstill during the past five years.

Fortunately, still, small voices of responsible scientists were to be heard through the roar of "ballyhoo," scientists who asked awkward questions. But, even if he speaks only quietly, the scientist can command cool reasoning and commonsense which are being appreciated more and more by the man-in-the-street—and the man-in-the-street is not a bovine illiterate—he's you and I.

Well, this has been a long P.S. and it has wandered far from the issues raised by Victor King in his article, but I think I have made my point clear!

THEY are still coming in! By "they," of course I mean foreign wireless stations. If you want to make an interesting little test just now, you can do so during the early afternoon of any but a thundery day. Set your tuning dial or dials down near the zero mark. Put your wave-change switch over to "medium" and turn on the "juice."

Then make a slow search over the "broadcast" band and I think that you will be surprised at your bag. The exact stations receivable will naturally depend a good deal upon your locality. If you live in the North you will hear the Scandinavian stations better than the Italians, whilst should you abide near the East Coast you will obtain better reception from central European stations than will be the case if your home is in Wales or Cornwall.

The New Paris P.T.T.

There are some big fellows, though, which seem to be receivable in most parts of the country by daylight. Amongst these are Stockholm, Rome, Langenberg, Hilversum and Heilsberg. And there is another, who has just come on the scenes; this is the new Paris P.T.T., a station that I can recommend to your attention for either daylight or after-dark reception.

Until quite recently Paris P.T.T. was only a 1.2 kilowatt, and he shared a wavelength

STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

with another P.T.T. station, Grenoble. The result was that neither was very powerfully received and you couldn't obtain good reception unless one or the other was silent.

Now we have a 50-kilowatt Paris P.T.T., who has the wavelength to himself, for Grenoble has moved to about 570 metres. The wavelength of Paris P.T.T. is 328.2 metres, and that part of the band should provide in a few months a particularly good test for selectivity. On the two next-door channels are Breslau and Milan, each of whom will soon become a super-power station. The set which will pick out any one from the other two won't be bad!

Some weeks ago the Scandinavian stations were not too good. There has been lately a distinct alteration and I have had good reception from a number of them. Those that you should try for if you have not recorded them for a while are Horby, Gothenburg, Stockholm, Oslo, Kalundborg and Motala. Also look out for Falun on 307 metres—I have heard him very well on several recent evenings.

Taking them all round, there is a very

ben, Belgrade, Brussels No. 1, Budapest, Bordeaux and Toulouse P.T.T.

There are a few, too, which are not quite so good as they were. Beromunster is one of these—his troubles are mainly due to heterodyne interference. Lwow has been showing rather more weak nights than he did, and I haven't during the last week or so had really good loudspeaker reception from Vienna.

Vienna on Long Waves.

The Vienna experimental station on 1,237 metres does not seem to be working quite so frequently as he was; perhaps he has to close down at intervals for circuit alterations during the tests. When, though, he is good he is often very good indeed, and I would recommend you not to neglect this wavelength when on the long-waves.

Amongst the very best of the medium-wave stations at the time of writing are Florence, Prague, Brussels No. 1, and Langenberg with Rome, Stockholm, Katowice, Frankfurt and many others.

R. W. H.

MY incurable optimism has led me astray! In spite of repeated prophecies that "conditions will be good by the time you read this," they are still as bad as ever. Of course, by the time you read *this*—But no—I'll leave it unsaid!

For those who like to enter a little competition I am asked to give details of a private contest that is taking place next weekend (May 22nd). On that day, from 00.00 till 24.00 B.S.T., our two friends, F. N. B. (Cheshire) and M. S. (Harlow), are trying to do each other down. Stations logged are to be amateurs on telephony only; wavelengths between 0 and 200 metres. The two logs are coming in to me for judging, so that if any others care to send theirs for the same period to me, via the Editor, I shall be able to tell them if they have beaten the champions.

Kootwijk Calling.

F. J. F. (Raynes Park) administers a mild castigation to me about my one-valver. He says there is nothing "hotted-up" or original about it—and, in short, that he is surprised at me for having the audacity to describe such a contraption!

The trouble is, F. J. F., that you expected a "contraption" and are disappointed to find a receiver that is conventional in appearance. The "One," as described, is what I would call a "mild" version of my own rather "hotted-up" single-valver.

SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

Designers of racing-cars find out useful things with them, which are passed on to the public as improvements in their standard touring models; give the public the racing cars and they might not be able to do anything with them. Do you follow the analogy?

M. S. gives me the first details that have yet reached me of a new transmission just below G 5 S W-P D V (Kootwijk, Holland). He is tremendously strong—I have found him myself since—but is apparently only in the testing stage as yet.

I see from the latest issue of "QST" that the Americans have pushed ahead with 5-metre work to very good purpose. Tests between a plane and a number of ground stations have resulted in communication on this wavelength over a distance of

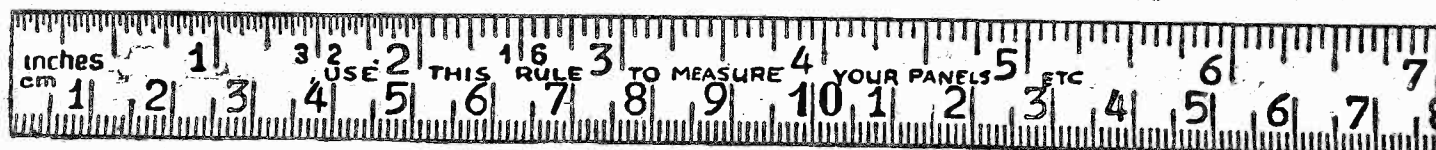
115 miles! This, of course, somewhat upsets the apple-cart, as far as our previous theories are concerned. True, no such range seems to be possible between two ground stations, although they were situated on the tops of mountains and on tall towers.

It has always been said that 5 metres—and, to a lesser extent, 7 metres—is almost a "visible" wave. If you can see the other fellow (although you may need a telescope to do it), you stand a chance of hearing him. But if there are any blind corners, hills, buildings or obstructions of any kind in the way, it is a different matter altogether.

Super-Regeneratives Again!

Incidentally, the only good receiver for 5 metres appears to be a super-regenerative. In case this should conjure up visions of the fearsome Armstrong circuit to any old-timers who read this; let me add that "super-regens." have been much improved and much tamed since the old days. I am on the point of trying one out for 5-metre work myself, and will pass on anything interesting that arises from the experiments.

Quite as an aside, I find that J. W. B. (Bretton) has written me about the super-regenerative receiver for general short-wave work. He finds it excellent, and remarks on a point that struck me when listening to one—that even ultra-short-wave tuning seems quite broad. No, J. W. B., I can't think of a method of using my S.G. receiver as an Armstrong at the moment.



FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



INEXPENSIVE H.T.

It is curious how the modern H.T. battery has developed into a kind of self-advertisement. I regard this as an expression of trade confidence. Some of you may remember that the earlier H.T.'s were merely plain black and blue boxes, with plug-holes disposed in tarry black masses at the tops.

But, nowadays, the H.T. battery is blatantly, almost joyously, labelled all over as though it were permanently entrenched in its own carton.

A GOOD BATTERY



This new Pertrix H.T. battery is passing its "P.W." tests in an admirable manner.

Look at the above photo of an H.T. battery recently introduced by one of our most prominent advertisers. One glance at that photo and you know all about this particular accessory—its make, type and price.

It is, indeed, obvious that Pertrix are not following the "sell and forget" policy, and that, on the contrary, they are determined that their customers shall have a constant reminder of the origin of the accessory.

Not that this is anything but good salesmanship, for Pertrix batteries are first-class and do not need to hide their lights under a bushel of black tar!

That new Junior model shouts "I am a Pertrix and not ashamed of it."

As I have said before, we have used many "Pertrix" batteries in the Research Dept., and so far no one has ever let us down. We have one of the new "Junior" types on test at the moment of writing, and we are finding it to be well up to "Pertrix" standard.

And inasmuch as it gives you 120 volts for 11s., it is very good value for money. Finally, it is "Junior" in the Pertrix range, but that must not lead readers to think that it has less capacity than the average "standard" type, for it has not.

Its name gives, I venture to suggest, something of a wrong impression of its qualities.

PREVENTING DIAL SLIP.

In referring to a recent article on the above subject, which appeared in "P.W." a few weeks ago, Messrs. H. Clarke & Co., Ltd., draw our attention to a

knob of theirs which entirely overcomes the trouble.

There is no grub screw; you file a flat "face" on the spindle, push the knob on and it "stays put" with no possibility of slip. It is a sound scheme.

NEW "MOTOR" LOUDSPEAKER UNIT.

I have received details of the new British-made "Motor" loudspeaker unit. It is of the balanced armature type, and appears to incorporate some excellent features.

VARLEY SUPER-HET COILS.

Messrs. Varley are now in production with "Square Peak" Super-Het Coils. There are three models, viz.: Single Control Aerial, Single Control Oscillator, and a Three-ganged Unit on base, in which the two preceding coils are incorporated, together with an H.F. transformer. The price of this complete unit is 30s.

THE VARIO CHOKE.

Sovereign are on sure ground with their new Vario Choke. It is a device which fits into modern set-designing requirements, as it combines in the one article the functions of two separate items which are in frequent use, viz., an H.F. choke and a variable feed control enabling amplification adjustment easily to be made.

Alternatively, the Vario Choke can be employed as a Vario H.F. choke to give the same effect in certain circumstances in the strictly literal sense of the words.

It has further uses, such as H.F. "stop-ping," so altogether it is a gadget which constructors should enthusiastically welcome, and especially as it costs only 3s. 6d., which is not a high price for nothing more than an H.F. choke of ordinary qualities, let alone a versatile, combination article.

There are three terminals on the component and one of these is shared by the H.F. choke and the adjustable condenser. One each of the other two terminals serves the respective "free" ends of the condenser and choke.

So you see, either of the two sections can be employed separately by the experimenter if he so wishes.

We have used Vario Chokes in several different manners, and find it fulfils its functions with high efficiency, either as simply an H.F. choke or in its special applications. It is particularly useful in an H.F. inter-stage position, when its control of amplification enables a high performance to be obtained with complete stability.

WORTH SENDING FOR.

Tunewell Radio have published a folder which they entitle The Tunewell "Guide To Super Radio."

It is a very well designed and printed publication and it should strongly appeal to constructors in that it embodies eight useful circuits, including a Band-Pass All-Mains Three, in addition to full details of a very interesting and useful range of radio components. This Tunewell folder is available, post free, to all who care to write for it.

PLEASE NOTE

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

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

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

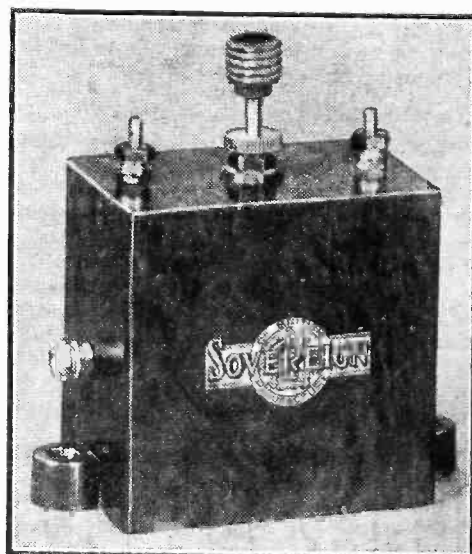
AN INDOOR AERIAL.

Those readers who are unable or unwilling to erect outdoor aerials will be interested in the Braided Indoor Aerial made by Melbourne Radio. This costs only 1/6, and comprises a thick, very softly pliable braided material, with insulating hooks at each end and a terminal for connecting purposes.

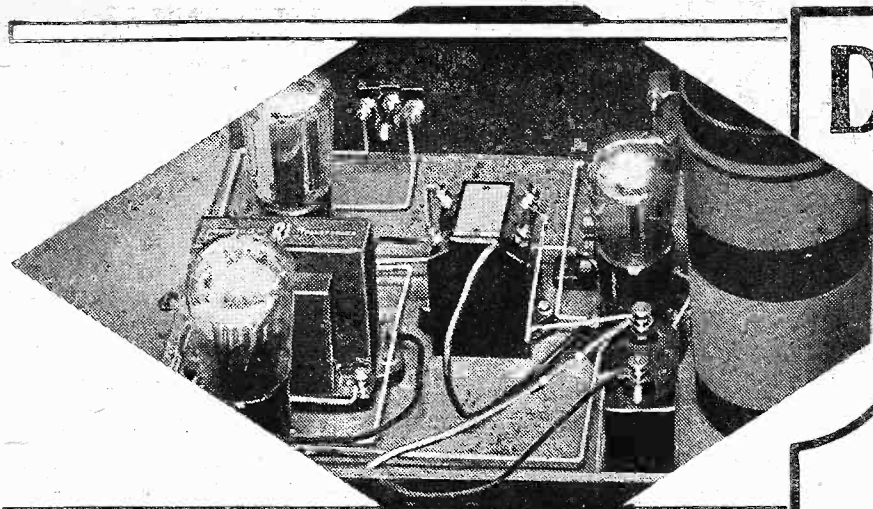
It is about seven feet in length. I like the colouring—it is a kind of "old gold," and I also consider it has a good pick-up for its length.

Of course, much of its efficiency depends upon its location, and the higher in the house it is fixed the better the results. Personally, I think it could be a little longer with advantage.

A VERSATILE COMPONENT



The Sovereign Vario Choke has several very useful applications, and is an inexpensive device.



Decoupling for Your Set

DECOUPLING often improves the performance of sets employing L.F. stages, as it prevents any tendency to L.F. oscillation. Actual oscillation is indicated by motor-boating or by a squeal, the pitch of which does not alter with the tuning.

Oscillation can, however, and often does, occur with no other indication than a distorted or rough tone from the speaker. Sets operated from a mains unit are more prone to this trouble than battery ones, though a battery which has been in use for some time is a frequent offender. Decoupling may, therefore, make your H.T. batteries useful for a longer period.

Output Stage First.

In general it is best to "decouple" the last valve first. How is this done? It simply means that you should use an output filter consisting of either a transformer, or of a choke and condenser, the choke being a 20- or 30-henry one for power valves and about 50 henries for a pentode. With the latter a tapped winding is best, as you can then choose the most suitable tapping for

A snappy article that tells you how motor-boating, L.F. howling or instability can be mitigated by the use of decoupling.

By H. A. RAMPTON.

Of course, decoupling the output valve circuit by means of a choke or transformer is more expensive than using a resistance to decouple an earlier valve, but it is well worth the extra money.

Among the advantages in addition to those mentioned are the prevention of direct current from passing through the L.S. windings, the ability to connect the speaker leads either way round, a slightly greater H.T. voltage available at the anode of the output valve, and the simplification of extension leads for the loudspeaker. This last is because these leads no longer have to carry the H.T. current.

If your set is still unsatisfactory with this addition, the detector valve should be the next to receive attention. In this case the decoupling components are used solely for this purpose, though in a receiver operating from a mains unit they may assist in reducing hum and in dropping the voltage to that suitable for the valve.

Resistance Values.

If you have no surplus voltage you should try a value of 20,000 ohms with a condenser of 1 or 2 mfd. (See Fig. 1.) This should effect a considerable improvement. You may have to put up the voltage for the detector, but no more current will be drawn from your batteries than formerly.

Using a decoupling resistance of 10,000 ohms may in some cases be satisfactory, and then not so much voltage is dropped. On the other hand, with this value of resistance it may be necessary to increase the value of the condenser to 3 or even 4 mfd. to obtain appreciable benefit from the scheme.

The same values will be satisfactory for an intermediate L.F. stage. For an H.F. stage it used to be thought that a resistance of only 600 ohms would be sufficient, as it would effectively prevent the H.F. currents from feeding back.

The value given was, however, quite wrong, as we have since realised. Not only is it necessary to keep out the H.F., but

the L.F. as well. Thus the same values as used for the detector and L.F. valves may be used. In addition the value of the condenser needed may be found to be somewhat less, 1 mfd. often being adequate.

Not only are anode circuits decoupled in modern sets, but if you use "free G.B." or obtain your grid bias from a mains unit, it may be found advisable to decouple the grid circuits as well. Here we are up against an easy proposition. We can use any value of resistance we like because there is no direct current flowing through it! For the same reason we need not use resistances of the wire-wound type if we do not wish, as the grid-leak pattern will be perfectly satisfactory.

Improving Quality.

Again, since the larger the value of the resistance the smaller need that of the condenser be, we can use a small condenser, with a consequent saving in cost. In Fig. 2 there will be seen the connections for a

JUST TWO COMPONENTS

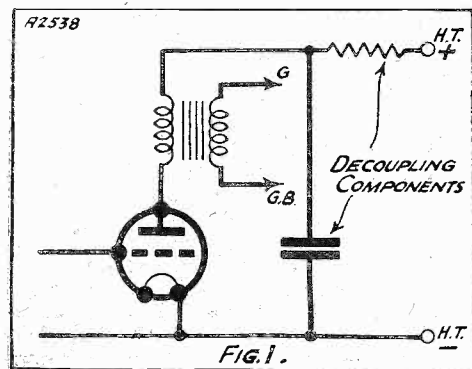


FIG. 1.
A simple spaghetti resistance and a fixed condenser are all that is necessary to decouple the detector valve's H.T. circuit.

the speaker, but a centre-tapped component will be satisfactory.

With a pentode the lead from the condenser should go, not to the valve anode, but to the centre-tap on the choke. The alternative method of using an output transformer is equally satisfactory, but you should obtain one to suit the valve and speaker used, or else a multi-ratio transformer.

IN THE G.B. CIRCUIT

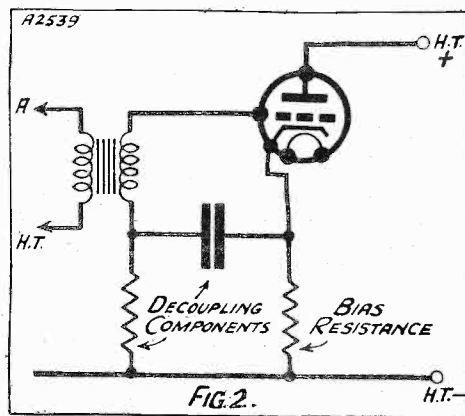
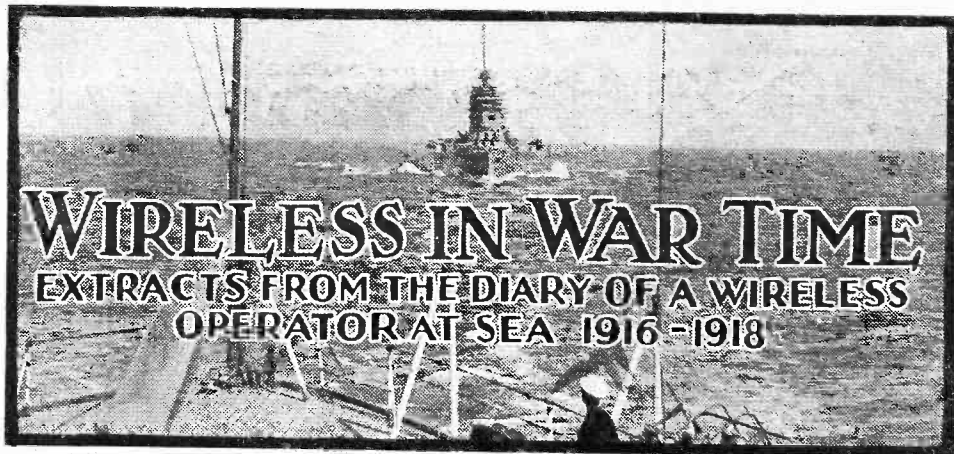


FIG. 2.
In mains receivers employing automatic grid bias it very often improves quality to decouple the grid from the anode current fluctuations.

valve using "free G.B." with decoupling added to the grid circuit. With an output valve, the best values have been found in practice to be 100,000 ohms and 1 mfd. condenser. However, a 4-meg. grid leak can be used for the resistance without upsetting the performance.

A final point: for decoupling the screened grid of an H.F. valve, always use a non-inductive condenser. A capacity of 1 or 2 mfd. will be needed for the purpose.



FEBRUARY 1ST.—Yesterday evening we had another war warning which made us all jump, as our destination lies just about where the submarine was reported to be. Here's the message: "To all British Merchant Vessels, de G. C. K. (Crookhaven). Submarine sighted 16 miles west of Smalls 5 p.m. 30th. Also 30 miles S.S.W. of Start 9 a.m. 30th. Submarine active 2 p.m. 31st. Latitude 51° 16' N., 8° 55' W. Also active in vicinity of Longships. Ships for the Clyde are not to pass eastward of Ailsa Craig. Ships for Weymouth Bay to ask for instructions from local patrol vessels." Message ends.

Quite a little surprise packet for the captain. He has already lost one ship in the Pacific, so naturally he's nervy.

Off the Irish Coast.

FEBRUARY 2ND.—Sighted the Irish coast early this morning. Two or three fresh war warnings received in the cabin—one, a submarine seen 2 miles off Fastnet yesterday evening. We passed Fastnet and Crookhaven an hour ago, so we are O.K. However, a little while ago somebody thought he must be funny, and shouted: "Suspicious craft starboard."

I ran out on to the bridge and there, sure enough, was a long, silver kind of streak some distance away, but looking rather like a submarine. The captain yelled out "Hard a' starboard," but all for nothing, as it was only one of our own cruisers which had caused a reflection by the sun.

Submarine Activities.

FEBRUARY 4TH.—Sighted the shores of Pembroke this morning. The Excise officers were aboard yesterday, and told us that over 600 merchant vessels had been sunk by submarines during 1916. It is reckoned the Germans bag 12 a week on the average. Later: We have just passed quite close to Lundy Island.

Have sighted Hartland Point, Devon, but I could not make out Ilfracombe or Woolacombe.

Later: Just received a message *re* a submarine reported to be chasing a transport off Land's End. Also, a report of another submarine seen off Galley Head. This morning I picked up a message from the land station G.L.D. answering an S.O.S. sent out by some ship which had been fired at by a submarine in the Channel. 7 p.m. Just picked up another S.O.S.

The submarine reported off Galley Head earlier this morning has torpedoed a boat, and the ship is now sending out a call for assistance. The message I picked up began:

"S.O.S.," gave the name of the ship, and then ran: "Torpedoed off Galley Head." The S.O.S. was repeated until an answer was received from G.L.D. A battleship also answered her call.

Sheerness at Last.

FEBRUARY 7TH (8 p.m.).—We have anchored off Sheerness. As I write there is an insistent boom of big guns from the other side of the river. I wonder whether it's naval target practice, or what? About a dozen searchlights keep playing across the water. The scene in many ways is a unique one, especially when a searchlight turns an inquisitive eye upon some large ship. We have an armed guard of marines aboard now under the command of Captain

London to report for duty again. This has been a queer, yet interesting trip, and I am wondering now what sort of ship I shall be sent to next.

On a Prize Ship.

[EDITOR'S NOTE.—The writer of this diary was eventually transferred as operator-in-charge to a captured German vessel operating under the orders of the India Office and the Admiralty. For obvious reasons, it is again necessary to suppress the name of this ship, and also the names of the various individuals our diarist met while serving abroad the ship. The diary continues as follows].

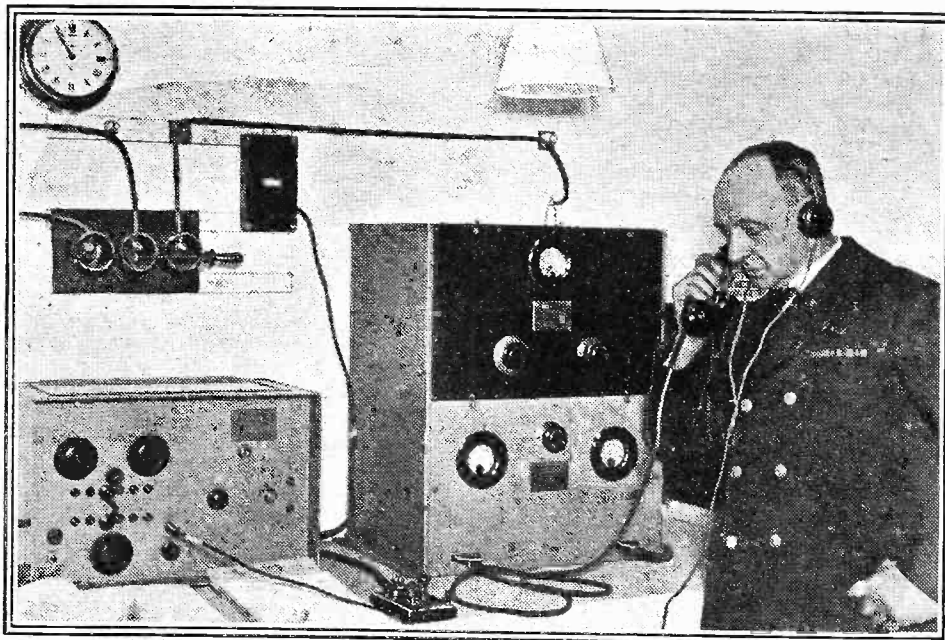
On board H.M. Prize Ship "—" March 23rd, 1917.

In the first five minutes after going on watch to-day I picked up two S.O.S. calls from torpedoed ships off Prawle Point. We have one or two Government official passengers on board, and one or two military men. Our final destination is Basra, Mesopotamia, but we are now making for Alexandria.

MARCH 24TH (7 a.m.).—I am jotting this down in the lull of the excitement, for we are "doing a bunk" from what the Chief Officer calls "a ruddy tin fish." I have informed the wireless station at Lands End of our position, just in case we "got the bird."

It all started about half an hour ago, with the firing of the 4.7 gun on the poop, and the shouts of the lascars as they swung the boats clear of the davits. In a flash I was out on the boat deck and, staring

A PRESENT-DAY RADIO CABIN



As a contrast to the comparatively primitive radio apparatus that was installed in ships in the period covered by our contributor's diary, here is a corner of a modern liner's wireless cabin.

"—" R.N.R. He's the biggest swanker I've ever met. He somewhat resembles Ferdinand of Bulgaria in appearance. The pilot has warned us to expect ructions when this particular chap came on board. He is a blustering, go-ahead sort of fellow, and comes into the saloon like a whirlwind. "Good-morning, good-morning, gentlemen Good-morning, gentlemen all," is his usual opening.

FEBRUARY 9TH.—We were paid off from the ship to-day, and I am going up to

carefully astern, I could see the submarine quite clearly, cutting the water in a long wave.

The gunners managed to get in about two rounds before she submerged, and for some minutes we were left wondering what was going to happen next. And then, away to starboard, we saw the periscope again. The gunners must have wasted quite a lot of shot, but they certainly didn't score a bull.

(To be continued.)



THE TYMPANIST HAS TWO NOTES ONLY— *but he puts them in because the rhythm needs them*

—and you need the current of an Improved Lissen Battery in your receiver if you want to hear these same two notes properly.

For the current of an Improved Lissen Battery enables you to recognise the individual instruments of a band. Like many others, when you use an Improved Lissen Battery for the first time you may realise that your favourite radio band has more instruments in it than you thought.

THE SECRET OF THE TEST TUBES

60 VOLT
WAS ~~7/11~~ NOW **5/6**
100 VOLT
WAS ~~12/11~~ NOW **9/3**
120 VOLT
WAS ~~15/10~~ NOW **11/-**

The noticeable improvement in your reproduction is due to the extraordinary power output of your Lissen Battery. There is a process used in this battery which produces power of remarkable purity; power so sustained that over prolonged periods of time it remains steady, noiseless and abundant always. So long does the battery last that a **PRINTED LIFE GUARANTEE** is given with every Improved Lissen H.T. Battery sold.



Ask by name for an Improved Lissen H.T. Battery. Obtainable from all radio dealers.

THE MIRROR OF THE B.B.C.

By O.H.M.

THE SCOTTISH REGIONAL

LISTENERS' ASSOCIATIONS—THE ANONYMITY CRISIS—
"A NATIONAL BROADCASTER"—EMPIRE DAY.

CLOSE on the heels of the opening of Broadcasting House has come the opening of Westerglen, the new Scottish Regional Station. This occasion has been something of a personal triumph for Mr. David Cleghorn Thompson, the B.B.C. Director in Scotland, and his enterprising assistant, Mr. Moray MacLaren.

There was the usual press view at Falkirk, and then in the evening the magnificent main studio in Edinburgh was the scene of a 19th Century Costume Ball on behalf of charity, patronised by fashionable Scottish Society. So far, so good. The twin-wave transmitters at Westerglen undoubtedly will give a much improved service to the densely populated areas of the Lowlands.

But there is no prospective solution of the problem of serving the Highlands. Provost Murray of Dingwall, supported by many representatives of other local authorities in the outlying areas, continues his campaign. It is difficult to see what the B.B.C. can do about it unless the Regional Scheme is upset, in other words, unless some of the facilities now enjoyed by the more populous districts are withdrawn.

I understand that the whole problem is being seriously reviewed at Portland Place, but that it is unlikely that any constructive proposals will be announced before the Madrid Conference.

Listeners' Associations.

Nothing has been heard of the Wireless Organisations Advisory Committee for some time. This Body was created at the beginning of the Corporation five years ago. It was meant to carry out the intention expressed in a recommendation of Lord Crawford's Committee of 1925, which went out of its way to stress the importance of Advisory Committees in general.

It was the nearest approach which could be designed to represent the views of the man-in-the-street. The Wireless League, the Radio Society of Great Britain, the Radio Association, and one or two other similar volunteer bodies were represented on the committee which was presided over by Captain Ian Fraser, M.P.

It seems as though this committee has either abdicated of its own accord or has been politely pushed aside by the B.B.C. Anyway there is no recent account of its proceedings, if any.

And now, three of the listening groups in Warrington, under the Adult Education Scheme of the B.B.C., have formed themselves into a Listeners' Association. Other groups are manifesting active interest and it looks as though a new kind of National Representation of listeners may emerge.

The Anonymity Crisis.

I have been trying without much success to discover the principle and basis of the application of the anonymity rule, which is supposed to be applied to the B.B.C. staff. On the one hand, programmes produced by members of the staff are acknowledged personally and not inconspicuously.

On the other hand, equally excellent work carried out by the very able engineers of the B.B.C. is not acknowledged to those concerned. Then again, there is a curious embargo on the names of announcers.

The irregular situation resulting naturally creates jealousy and a sense of unfairness. The wise and right thing for the B.B.C. to do is to rescind the anonymity rule, which at present is not really applied, and which in no circumstances could be satisfactorily applied.

257 STATIONS ON THE "COSMIC"!

LONDON READER RECORDS REMARKABLE RESULTS ON
"P.W.'s" FAMOUS 3-VALVER.

Hampstead Garden Suburb, N.W.11.
Dear Sir,—Many thanks for that marvellous set, the "Cosmic" Star, which I have recently built up. I have received 257 stations, all of which have been identified. The majority of these stations were received when an old 100-volt H.T. was in use, but now I have an H.T. eliminator. I live within ten miles of the powerful twin-wave station, Brookmans Park, and am using a low 75-ft. aerial, but I can cut out the "twins" within 7 degrees, thanks to the moderator.

Thanking you again, and wishing "P.W." every success,

22/4/32.

I am yours faithfully,

A. P. MORGAN.

P.S.—I forgot to mention that I enjoyed the "P.W." programme from Lisbon very much. EDITORIAL NOTE.—The full list of stations identified is far too long to be repeated in "P.W." but it clearly shows that the dials must be "alive" with programmes! Among the catches on long waves are Leningrad—always a difficult station to receive—and Lahti, the little-known Finnish station, on 1,796 metres. On medium waves the set roped in such out-of-the-way places as Riga, Helsinki and Tallin, while on the short waves the broadcast and amateur stations heard are dotted all over the world!

"A National Broadcaster."

It sounded strange to those who recognised his voice that Mr. Percy Edgar, the Midland Regional Director, should be

taking a part in the light musical show "Little Miss Make Believe," which Charles Brewer, his second in command at Birmingham, produced recently in the new studios at Broadcasting House for National and Regional listeners.

But Mr. Edgar has a fine microphone personality and in some things he really excels. I doubt if anyone could have done a better running commentary on the opening of the Stratford-on-Avon Shakespeare Memorial Theatre than that in which Mr. Edgar told the world what was happening for half an hour before the arrival of the Prince of Wales.

A well-known Midland divine wrote afterwards that "one could visualise every moment, and the little touches by which you portrayed the crowd, the costumes worn and the thronged river and banks made the occasion live almost as though we were present."

Many other tributes to Mr. Edgar's fine descriptive powers were also sent in by listeners all over the country, and one correspondent was so enthusiastic that he described the Midland Regional Director as a "National Broadcaster." His own listeners will have another opportunity of hearing Mr. Edgar again on Wednesday, June 1st, when he gives his monthly talk on "Coming Events."

Mrs. Edgar Wallace.

Had he lived, poor Edgar Wallace would have made many appearances before the microphone, and I personally have no doubt that he would have become as attached to broadcasting as he had to the stage and the cinema. It was his wish to broadcast an appeal on behalf of Queen Charlotte's Maternity Hospital, in which he took a great interest, but the date was never arranged.

Now the appeal is to be made by Mrs. Edgar

Wallace on Sunday, May 22nd. On the following Sunday, Mr. Seymour Hicks is to speak on behalf of the Padcroft Boys' Home of the London Police Court Mission.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

THE opening of Broadcasting House begins a new phase in the history of broadcasting. We take broadcasting so much as a matter of course that we are apt to overlook the fact that a decade is not time enough for it to have established any deep-rooted traditions; but, meanwhile, we can inflate our chests with pride at the contemplation of a very healthy youngster, second to none.

With the passing (?) of winter, Saturday evening programmes lose an attractive feature. I refer to the football results. These were always a popular feature, provoking no criticism and claiming both high- and low-brow adherents.

If there was any grouching, it was against the B.B.C. rather than the results themselves. I believe that many listeners found the suspense of waiting for these results while items of news (insignificant in comparison) were read out very irritating.

Monday's programmes suffer correspondingly with the completion of Mr. S. P. B. Mais' series of talks. To say that these have been popular is to put it mildly. Mr. Mais had fulfilled a task which confers on him ambassadorial rank.

One only hopes that his attempt to open the eyes of men that they may see Great Britain in winter will not be in vain. If

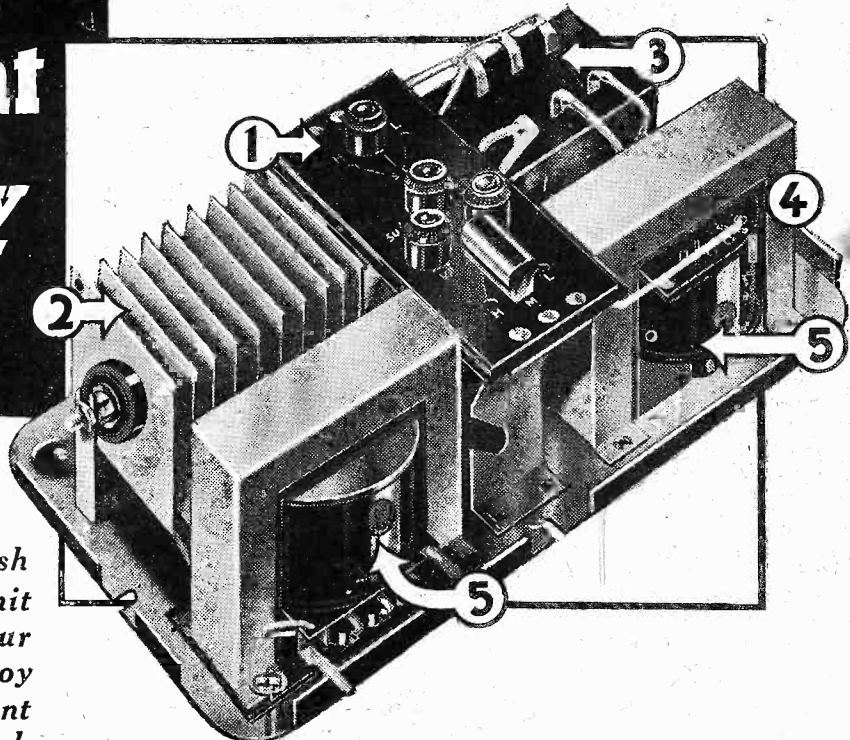
(Continued on page 322.)

High voltage. Ample current - for a penny a month

Change to an EKCO Unit and finish with batteries for ever! An EKCO Unit connected to your set in place of your usual battery means that you will enjoy all the advantages of an ample, silent and unvarying current supply at high voltage at a cost of only a penny a month.

There is an EKCO Unit waiting to give you better radio at the lowest possible cost. Choose the Unit suitable for your set from the Table or post coupon now for full details.

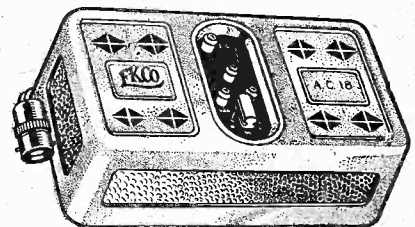
All EKCO Units are obtainable on Easy Payments.



- 1 Adjustable tapings giving three voltage ranges with perfect, noiseless contact. Patented plugs and socket for quick and easy connection of wires.
- 2 Westinghouse Metal Rectification.
- 3 Condensers tested to 500 volts.
- 4 All metal parts cadmium plated to prevent rust.
- 5 Choke and transformer coils wound on moulded bakelite bobbins.

Housed in solid drawn steel case, oxidised copper finish. Connecting plugs recessed below surface of case.

Size, 9 x 5 x 3 1/2 (K.25 and 25 cycle models 9 3/4 x 5 1/2 x 3 1/2).



EKCO

POWER SUPPLY UNITS

EKCO H.T. UNITS						
Model	Current Output	Voltage Tappings	Price	EASY PAYMENTS		
				Initial Payment	11 Monthly Payments of	
A.C. 12	12 m/A	S.G.; 80; 120/150	£2. 15. 0	6/6	5/-	
A.C. 18	18 m/A	S.G.*; 50/80*; 120/150	£3. 7. 6	7/9	6/2	
A.C. 25	25 m/A	S.G.*; 50/80*; 120/150	£3. 17. 6	8/9	7/1	
D.C. 15/25	15 or 25 m/A	S.G.*; 50/80*; 120/150	£1. 19. 6	6/-	3/8	

Combined H.T. & L.T. Charger Units (for A.C. Mains)						
Model	Current & Voltage	L.T. Output (for charging accumulators)	Price	EASY PAYMENTS		
				Initial Payment	11 Monthly Payments of	
K. 12	Current Output and Voltage Tappings same as Models A.C. 12, A.C. 18 and A.C. 25.	1 amp. at 2, 4 or 6 volts	£3. 19. 6	9/-	7/3	
K. 18		1 amp. at 2, 4 or 6 volts	£4. 12. 6	10/3	8/5	
K. 25		1 amp. at 2, 4 or 6 volts	£5. 7. 6	11/9	9/10	

Tappings marked * are adjustable.

To E. K. Cole, Ltd., Dept. A.10,
Ekco Works, Southend-on-Sea.

Please send me particulars of EKCO Power Units.

Name.....

Address.....

LAST week I dealt with the construction of the main portion of the set, and before passing on to the frame aerial windings and the mounting of the loudspeaker unit, I would like to stress two points.

The first of these is—*wire up as you go along*. This is important because of the compactness of the design.

The second point is—*stick to the components specified*.

The set has been built up in its final form after weeks of experimental work by the Research Dept., and the result is a blending of the most suitable parts for the job. Certain alternatives can be used, and these are mentioned in the component list.

An Efficient Frame.

Do not forget to mark all the L.T., H.T., and G.B. leads so that you can recognise them after the metal work enclosing the whole layout has been slid into position.

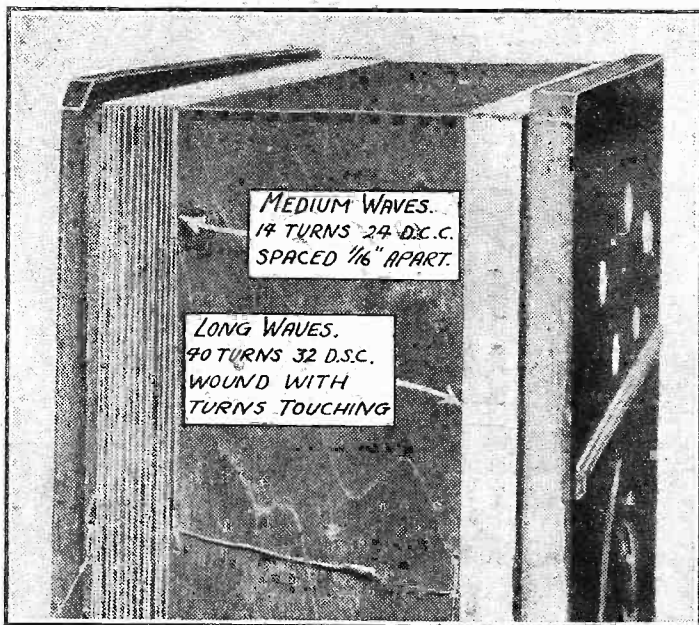
And now for the frame aerial. This is a simple winding consisting of two sections—one for the medium waves and the other for the long wave-band.

You will be able to see from the photograph exactly how it is wound

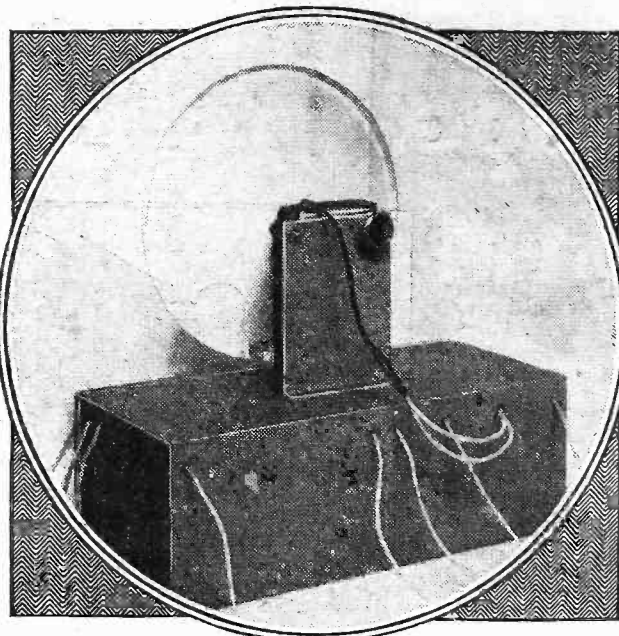
**ONLY THREE VALVES.
PROGRAMMES AVAILABLE
ANYWHERE AT ANY TIME.
VERY COMPACT.
UNUSUALLY LIGHT.**

The cabinet specified has an inner framework and an outer shell. The aerial is wound round this main framework, which is, in fact, the body of the cabinet. The medium-wave winding comprises 14 turns of No. 24 D.C.C., each turn being spaced $\frac{1}{16}$ in. The

FULL DUAL-WAVE POWER



There is first-class pick-up on both long and medium wavebands, and excellent daylight results are given.



SCIENTIFICALLY CLEAN ASSEMBLY

The set is built into a metal screening chassis, on which there is a simple bracket for mounting the speaker unit and cone.

end of the winding is then threaded through a hole in the woodwork and taken across the framework to the beginning of the long-wave section of the frame. This winding consists of 40 turns of No. 32 D.S.C., each turn touching, and is wound in the same direction as the medium-wave portion.

Connecting-up the Aerial.

You will notice from the photographs that the two windings are arranged one at each end of the framework.

The end of the medium-wave portion is joined to the beginning of the long-wave section.

Thus there are two flexible leads that connect up with the wave-change switch. These are the junction of the medium and long-wave windings, and the end of the long-wave section.

The beginning of the medium-wave portion goes to the fixed vanes of the first tuning condenser, and, of course, to the grid of the S.G. valve.

The Speaker Unit.

The end of the long-wave winding is actually taken to the moving vanes of the first tuning condenser, and then goes on to L.T.— of V_1 to the screening and to the wave-change switch. You will find this quite clearly shown in the wiring diagram in last week's issue.

Remember to leave plenty of slack in the

three flexible leads to the frame because these have to pass through holes in the metal box. They can easily be cut to size after the box has been placed in position on its runners as described previously.

Now for the mounting of the speaker unit. The unit in the original receiver is a Blue Spot, and this is secured to a piece of sheet

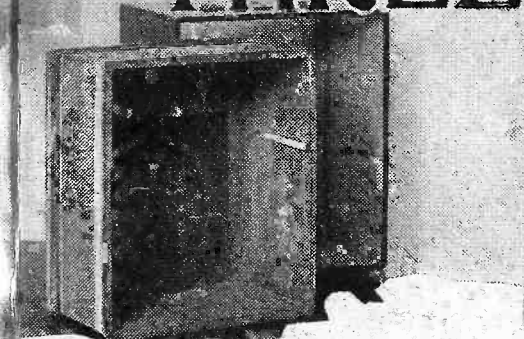
By A. JOHNSON
who gives further
the most suitable
set for home use
has ever been
published

YOUR INEXPENSIVE "OUTDOOR"

- 1 Aluminium box, screen and baseboard (Magna-num).
 - 1 Portable case (Camco Carrier).
 - 2 .0005-mfd. variable condensers (Formo mid-log line).
 - 1 .0003-mfd. differential reaction solid-dielectric condenser (Polar, Ready Radio, Telsen).
 - 1 On-off snap switch (Bulgin, B.A.T.).
 - 1 2-gang on-off push-pull switch (Cordo).
 - 1 H.F. choke (Sovereign Super, Ready Radio, Lissen, Wearite).
 - 2 .0003-mfd. fixed condensers (Formo Mikadensator, and Dubilier 670, or small T.C.C., Igranite).
 - 2 Horizontal valve holders (Parex and W.B., Lissen).
 - 1 Standard valve holder (Lissen, W.B., Graham Farish, Wearite, Bulgin, Telsen, Lotus).
 - 1 2-meg. grid leak with terminals or tags (Graham Farish "Ohmite," Lissen, Igranite, Dubilier).
 - 2 20,000-ohm resistances as above (Graham Farish "Ohmite," etc.).
 - 1 15,000-ohm resistance as above (Graham Farish, etc.).
- Note.—These resistances can be of spaghetti type if desired (Lissen, Bulgin, Varley, Lewcos, Tunewell, Telsen, Sovereign).
- 1 01-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Ferranti).
 - 1 .001-mfd. fixed condenser (Dubilier 670, T.C.C., Lissen, Sovereign, Ready Radio, Telsen, Ferranti, Graham Farish, Formo).
 - 1 L.F. transformer (Lissen Hypernik, R.I. Hypermite, Varley Niolet, Igranite Midget, Lotus).

A 1932 PORTABLE OF MOST

and the OUTDOOR THREE



LANDALL, aluminium bent at right angles and secured to the underside of the metal box by two wood screws which pass through into the wood baseboard. Messrs. Burne-Jones will no doubt be able to supply a specially-made bracket to suit desired speaker unit, provided they have the unit available for fitting purposes.

"DOOR" SHOPPING LIST

2 mfd. condensers (Dubilier type 9200).
1 output choke (Varley Pentode Nichoke).
1 cosmic dual-range coil (Goltone, Wearite, Telsen, Ready Radio, Sovereign, Peto-Scott).
1 1/2-in. tuning dials (Ormond).
1 ft. 18-gauge tinned-copper wire, and sleeving (Wearite), or Glazite, Soldawyre, Quickwyre, Mililix.
1 set of screws, etc.
1 sheet Kraft paper.
2 ss. 24 D.C.C. Wire.
2 ss. 32 D.S.C. Wire.

ACCESSORIES.

1 SPEAKER UNIT.—Blue Spot, Lissen, Telsen, Ormond.

1 VALVES.—1 S.G.: Mullard P.M.12A, or P.M.12, Mazda S.215, Marconi S.22, Osram S.22, Tungram S.210, Lissen S.G.215, Cossor 15S.G., Six-Sixty S.S. 215S.G.

Det.: Marconi H.2, Cossor H.L.210, Mullard M.1H.L., Six-Sixty S.S. 210H.L. (Note.—Many valves will not go into the set owing to their height.)

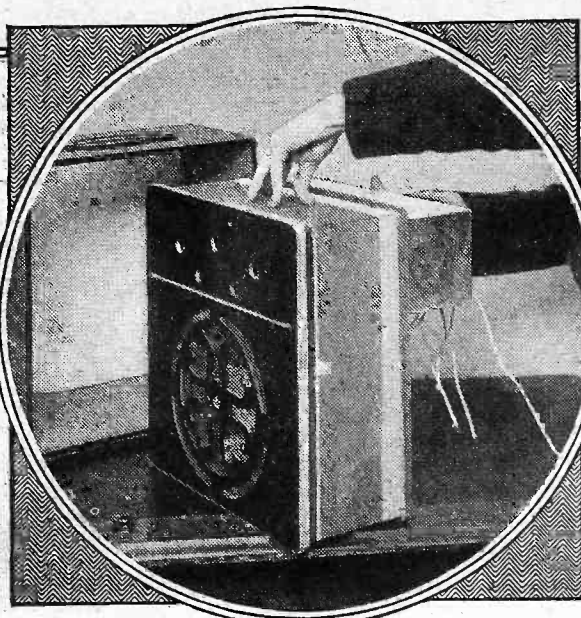
1 Pentode: Mazda Pen. 220. Lissen P.T. 225, Marconi and Osram P.T. 2.

1 BATTERIES.—H.T.: 2 of Drydex Blue Triangle 3 v., Ever Ready Popular P. Portable 63 v., Siemens H.1 60 v., Pertrix 237 60 v.

G.B.: 3 volts for 120 v. H.T.

1 ACCUMULATOR.—2 volts (Exide PC2, Oldham LV4, or other small portable type).

1 TUNING UNIT.—(Should be small and give 120 to 150 volts 15 m.a. max.) (Heayberd D. Minor, Atlas, R.I., Tunewell, Regentone, Formo, Cannon, Ekco).



NO SPACE WASTED

The chassis slides snugly into the cabinet, with the "works." completely screened from the aerial.

It is, however, a job that can be carried out by the constructor himself with very little trouble.

The main point is that the driving rod of the speaker unit should come directly opposite the centre of the fret on the front of the cabinet.

You Can Use Wood.

The cone should be of the same diameter as the fret, and the edges of the cone should just not touch against the cabinet front.

The necessary adjustments can be readily made by sliding the cone along the driving rod of the unit and afterwards fixing it in position by means of the locking device provided.

There is no reason why the bracket holding the unit should be of aluminium; wood will do quite as well, and if this is used, two small angle brackets of metal can be employed for mounting it to the underside of the metal box.

Now for a few words about making the cone. You will need a sheet of Kraft or any good cartridge paper, and from this sheet cut a circle 10 in. in diameter.

Cone Dimensions.

The circle is best drawn on the paper with the aid of a compass and the paper can then be cut round the pencil line. A second circle should be drawn inside the first, this circle having a radius of 4 1/2 in.

Before you actually cut the paper round the 10-in. diameter circle, mark off three lines in pencil. Two of these are radii 3 1/4 in. apart at the circum-

ference. The other line is a parallel one 3/8 in. from one of the radii, and represents the overlapping portion.

The diagram shows this more clearly than I can describe it in words. Cut round the large diameter circle with a pair of scissors, and remove the segment between the two thick lines (between one radii and the line which is 3/8 in. from the second radii).

Incidentally, the scissor-cut is made right along the radius from the circumference to the centre of the circle. Now shape the cone, bending it until the two radii are touching. Then secure in position by seccotining the overlap in place on the outside of the cone.

Some Battery Points.

When dry, gently bend back the edges of the cone along the inner circle so that you have a "turn-back" of 3/8 in. all round.

The photograph will make this clear. The cone is now complete and is attached to the driving rod on the unit by the locking device provided.

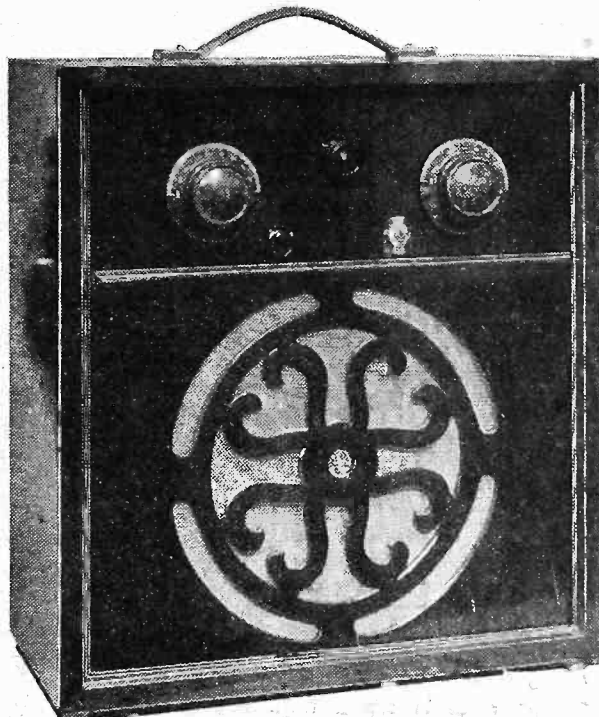
When you have completed the constructional work, and the set is assembled in

**EXTREMELY LOW CURRENT
CONSUMPTION.
EASY TO BUILD AND OPERATE.
NO SOLDERING.**

the cabinet, you can then place the L.T., G.B. and H.T. batteries in position.

You will have to choose your batteries (Continued on next page.)

CAN BE USED ANYWHERE



The great charm of the Outdoor Three is that it can also be used indoors, as it is of handsome appearance.

ORIGINAL AND EFFECTIVE DESIGN

BUILD THE OUTDOOR THREE

(Continued from previous page.)

carefully, giving due consideration to the question of space.

The L.T. battery is an unspillable type 2-volt accumulator, the grid-bias battery a $4\frac{1}{2}$ - or 9-volt strip, and the H.T. two 60-volt units, joined in series.

Fit the batteries into the cabinet, if necessary inserting strips of cardboard or rolled-up paper to act as wedges to prevent movement when the set is carried from place to place.

High-Tension Voltages.

Then connect up the various leads. H.T. +1 will want approximately 72 volts; but, of course, this value can be adjusted slightly in order to achieve the maximum

nothing about the directional properties of the frame.

All frame aërials are directional, and in order to obtain maximum volume from any given station, the frame should be oriented into the position of loudest signal strength. This effect will be found to be very marked and it has the further advantage of increasing the selectivity. So when you tune in the "local" just try the effect of rotating the set and you will immediately hear the difference in the volume when the frame comes into the position most favourable for reception from this particular transmitter.

The idea is the same for any station.

On Long-waves.

To receive on the long wave-band push the wave-change switch knob towards the panel and tune in as before.

Daventry 5 X X will, of course, be the station to "go for" first, and then Radio-Paris. And remember the directional properties of the frame whenever you require a little more selectivity.

And now I will conclude by giving a few general hints. Many of the faults in portables are due to loose connections. A single slack terminal will often cause loud cracklings in the speaker, and when this happens it frequently entails a laborious search before the offending connection is located.

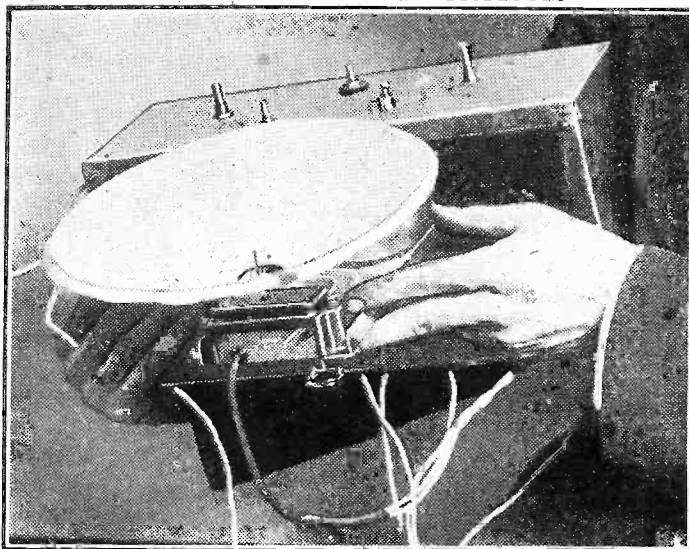
So I recommend you to pay particular attention to all joints under terminals, and to see that everything is well insulated and shipshape before you put the finishing touches to the chassis.

Another point is to make sure that the valves fit snugly into the valve holders.

Here, again, a little play is liable to cause unwanted noises and, sometimes, fading.

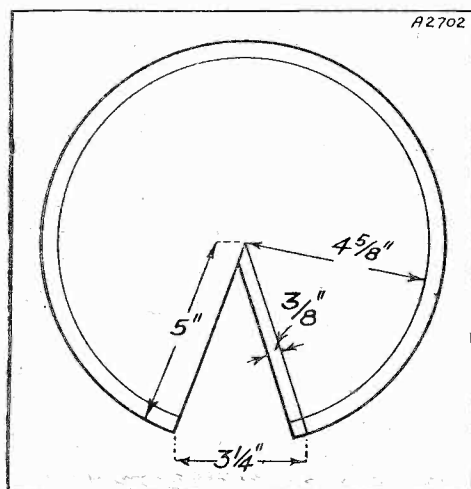
I stress these points because a portable is bound to be subjected to slight jars in the course of its work, and these aggravate

THE COMPLETED CHASSIS



The chassis with speaker fitted all ready for sliding into the cabinet—a very simple operation this.

CUTTING THE CONE



The dimensions of the paper diaphragm for the speaker.

degree of efficiency. The figure is about right for normal purposes, using the type of valve specified.

H.T. + 2 will be 120 volts, and G.B.— is 3 volts in the case of the Pen. 220.

With regard to the operation of the receiver, this is all plane sailing. There are two tuning controls, one for the frame and the other for the intermediate circuit.

The control on the left-hand end of the panel (looking at the front) is the frame-tuning condenser. Slightly below this, to the right, is the wave-change switch which changes over both tuned circuits simultaneously.

In the centre is the reaction-condenser, and to the left of the right-hand tuning control is the L.T. on-off switch.

Operation of the Receiver.

The preliminary tuning operation is best carried out on the local transmission, and the procedure is as follows:

Pull out the wave-change switch knob (this is the setting for the medium wave-band) and switch on the L.T.

With the reaction control at its minimum (knob fully rotated to left), turn the two tuning controls round until signals are heard.

Then rotate the reaction-control knob to increase the volume. I have, so far, said

any troubles due to faulty connections. Let me say something about tone. There are a resistance and fixed condenser in series across the output choke. The values chosen are the normal ones; but opinions concerning quality vary.

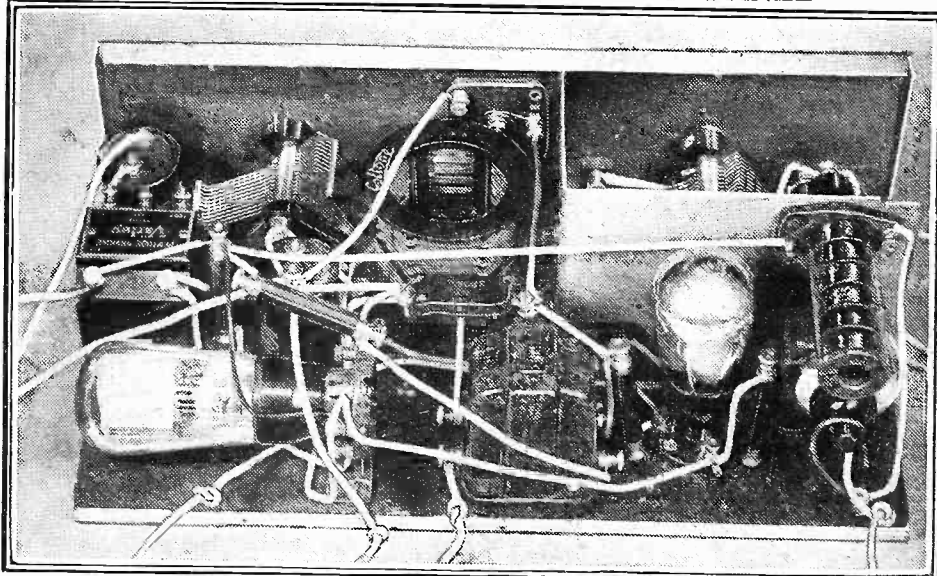
Varying the Tone.

Some prefer a fairly high-pitched tone, in which case the fixed condenser may with advantage be made smaller, or alternatively the resistance may have a higher value.

The effect of a large fixed condenser is to lower the tone by decreasing the amplification of the higher musical frequencies. A small condenser will have less effect upon the upper register and so the high notes will be more prominent.

Much depends upon the type of speaker unit employed, and also upon the stiffness of the cone.

SIMPLER THAN BASEBOARD AND PANEL



The inexpensive metal chassis is bought with all the necessary holes drilled in it. And, remember, there is no soldering to do.

Build "The OUTDOOR Three" with a READY RADIO Kit for OUTSTANDING RESULTS!

KIT "A" ... £4:11:0

Complete Kit of Components less valves and cabinet.

OR BY EASY PAYMENTS
8/6 down and 11 monthly payments of **8/6**

KIT "B" ... £6:12:0

with valves less cabinet.

OR BY EASY PAYMENTS
12/3 down and 11 monthly payments of **12/3**

KIT "C" ... £8:7:0

with valves and cabinet.

OR BY EASY PAYMENTS
15/6 down and 11 monthly payments of **15/6**

COSMIC STAR

KIT "A" ... 89/6

Complete Kit of Components and free blue print

OR BY EASY PAYMENTS
10/3 down and 9 monthly payments of **10/3**

KIT "B" ... £5:12:3

Complete Kit of Components as Kit "A" with valves and free blue print.

OR BY EASY PAYMENTS
10/6 down and 11 monthly payments of **10/6**

KIT "C" ... £6:13:3

Complete kit of Components as Kit "B" with Cabinet and free blue print.

OR BY EASY PAYMENTS
12/3 down and 11 monthly payments of **12/3**

	£	s.	d.
2 Rofino 0005 Log Mid-line Variable Condensers	8	0	
1 ReadRad 0003 Differential Condenser	3	6	
1 ReadRad Snap Switch	2	9	
1 ReadRad 2-gang "On-off" Push-pull Switch	3	6	
1 Sovereign Super H.F. Choke	3	6	
2 W.B. Horizontal Valve Holders	2	0	
1 Standard Valve Holder	1	6	
1 2-megohm Leak. with Terminals	1	6	
1 Lewcos 15,000-ohm Spaghetti Resistance	1	6	
2 Lewcos 20,000-ohm Spaghetti Resistances	3	0	
2 T.C.C. 0003 Fixed Condensers, Type "M"	2	0	
1 T.C.C. 001-mfd. Fixed Condenser, Type "S"	1	9	
1 T.C.C. 001-mfd. Fixed Condenser, Type "S"	1	6	
1 R.J. Hypermite L.F. Transformer	12	6	
2 Dubilier 2-mfd. Fixed Condensers, Type "BB"	7	6	
1 ReadRad Cosmic Dual Range Coil	6	6	
1 Varley Output Pentode Nichoke	12	6	
1 Packet of Jiflinx for wiring	2	6	
1 Ormond 24 Tuning Dials	2	0	
2 ozs. 24 D.C. Wire	2	0	
2 ozs. 32 D.S. Wire	1	10	
3 Valves as specified (Cossor 210 DET. P.M.12. Mazda PEN.220 Flex. Screws, etc.)	2	1	0
1 Polished Oak Cabinet	1	15	0
1 Aluminium Box Screws and Base-board	8	6	
	£8	7	0

Any component can be purchased separately.

S.T. 300

KIT "A" ... £3:18:6

less valves and cabinet

OR BY EASY PAYMENTS
7/3 down and 11 monthly payments of **7/3**

KIT "B" ... £5:10:9

with valves less cabinet

OR BY EASY PAYMENTS
10/3 down and 11 monthly payments of **10/3**

KIT "C" ... £6:9:3

with valves and cabinet

OR BY EASY PAYMENTS
12/- down and 11 monthly payments of **12/-**

S.T. 300 Adaptor

KIT "A" ... £1:18:6

Complete Kit of components less valve and cabinet.

OR BY EASY PAYMENTS
7/- down and 5 monthly payments of **7/-**

KIT "B" ... £2:15:0

Complete Kit of components with valve less cabinet.

OR BY EASY PAYMENTS
10/- down and 7 monthly payments of **7/6**

KIT "C" ... £3:10:0

Complete Kit of components with valve and cabinet.

OR BY EASY PAYMENTS
10/- down and 9 monthly payments of **7/6**

Head Offices:

EASTNOR HOUSE, BLACKHEATH, S.E.3.
'Phone: Lee Green 5678.
'Grams: Readirad, Blackvil.

Showrooms:

159, Borough High Street, London Bridge, S.E.1. 'Phone: Hop 3000.

IMMEDIATE DISPATCH

READY RADIO

To INLAND CUSTOMERS

—Your goods are despatched Post Free or Carriage Paid.

To OVERSEAS CUSTOMERS

—Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon the delivery of the goods. All goods are very carefully packed for export and insured. All charges forward.

CASH or COD ORDER FORM

To: READY RADIO, LTD.,
Eastnor House,
Blackheath, S.E.3.

Please dispatch to me at once the following goods.....

for which { (a) I enclose (cross out line) £
(b) I will pay on delivery (not applicable)

Name

Address

P.W. 21/5/32.

To: READY RADIO, LTD.,
Eastnor House,
Blackheath, S.E.3.

Please dispatch to me the following goods.....

for which I enclose first deposit of £

Name

Address

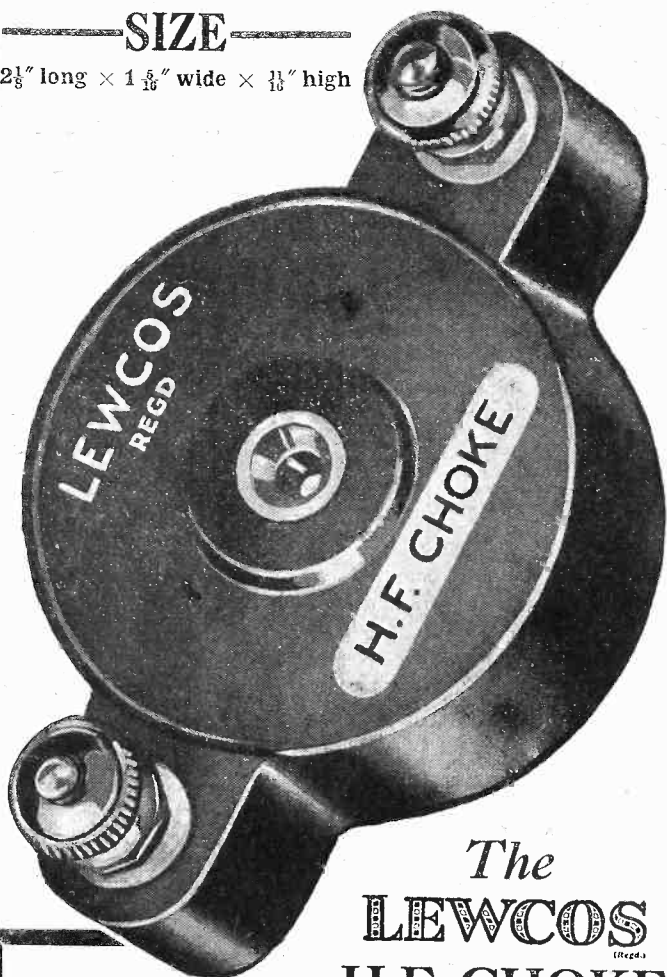
P.W. 21/5/32.

EASY PAYMENT ORDER FORM

A miniature MARVEL

—SIZE—

2½" long × 1⅝" wide × 1½" high

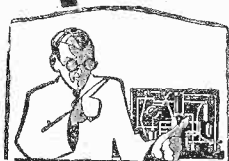


The
LEWCOS
H.F. CHOKE
(Type M.C.)
Price 2/6

Qualities such as those embodied in the Lewcos Type M.C./H.F. Choke are seldom found in even more expensive and larger chokes. Rigorous tests have proved that maximum choking effect is obtained with ease, and its small size makes its use especially suitable where space is limited.

The exceptionally low price of this component has already established it as a permanent favourite amongst both experts and amateurs.

LEWCOS Spaghetti Resistances are suitable for any circuits, being made in 18 different values, and are obtainable at prices ranging from 9d. to 1/6.



We respectfully request
the public to apply to
their local radio dealers
as we only supply direct
to the trade.

F.T.
LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION
THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED
CHURCH ROAD, LEYTON, LONDON, E.10

IMPRESSIVE Performance

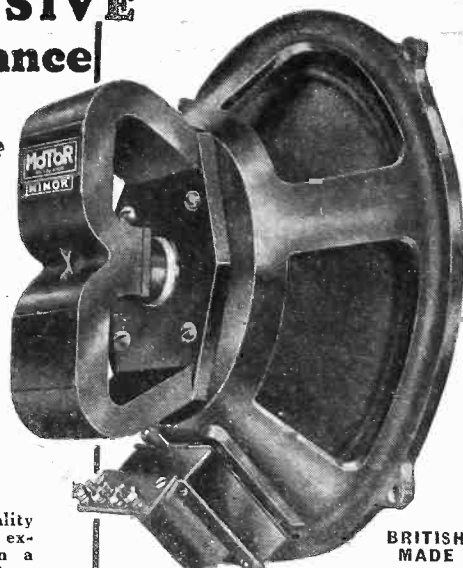
at an
**Impressive
Price!**

The MoToR "Minor" is not, in spite of its price, a "cheap" moving coil loudspeaker. It has a superior magnet of finest cobalt steel; a large rear suspension providing unusual flexibility; a heavy cast aluminium chassis; non-metallic spider; and every high-grade feature of construction and design for which all MoToR speakers are acknowledged.

Impressive in tone quality and sensitivity, it gives excellent results on even a two or three-valve battery operated set using ordinary output valves.

Write for free illustrated descriptive pamphlet.

MoToR
MINOR
Permanent Magnet
MOVING
COIL SPEAKER



**BRITISH
MADE**

Overall Diameter, 9½".
Overall Depth, 4½".
Cone Diameter, 7".

45/-

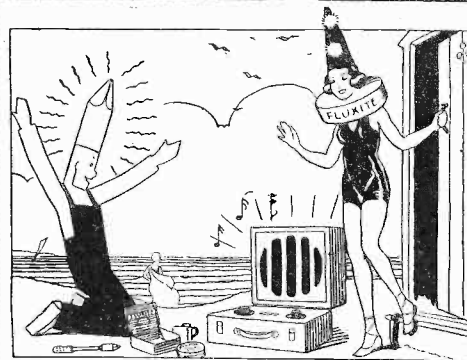
Including Trans-
former and
Baffle Board.

D.C. Resistance: 10 ohms.
Impedance of Speech-
coil: 5 ohms.
Approx. Coil Gap: 1 mm.
Transformer Tappings:
25:1, 20:1, 15:1.

The CHESTER

The handsome figured walnut cabinet version of the MoToR Minor Moving Coil measures 16" by 15½" by 8", and has no equal at anywhere near its common sense price of **75/-**.

TEKADE RADIO & ELECTRIC LTD.
147, Farringdon Road, London, E.C.1
Telephone: Clerkenwell 2486.



"We're Fluxite and Solder, the reliable pair,
Famous for Soldering—known everywhere!
See that we're with you—when out on that trip,
Avoid disappointment—have that musical 'dip'!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

All Hardware and Ironmongery
Stores sell Fluxite in tins, 8d.,
1/4 and 2/8.

ANOTHER USE FOR FLUXITE
Hardening Tools and Case Hardening.
Ask for Leaflet on improved method.

NEW "JUNIOR" SIZE, 4d. per tin.

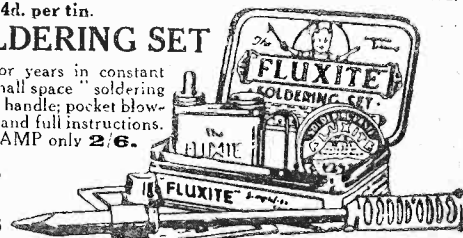
FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc., and full instructions. COMPLETE, 7/6, or LAMP only 2/6.

FLUXITE LTD.

(Dept. 324),

ROTHERHITHE, S.E.13



ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

CAPT. ECKERSLEY'S QUERY CORNER



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

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

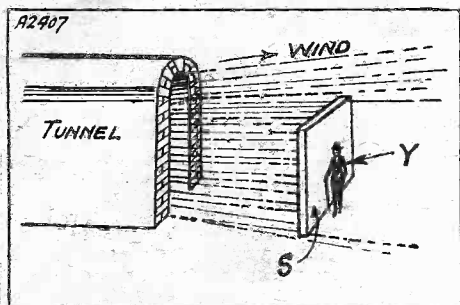
A Curious Shielding Effect.

S. B. (Seven Kings).—"My house is, I believe, roughly sixteen miles from the Brookmans Park transmitter, and I always imagined that, at this distance, one's reception was almost entirely due to the transmitter's 'direct ray.'

"Since, however, the evenings have become lighter, I find the National programme noticeably weaker, and with nightfall an increase of signal strength occurs. Is this an indication that my aerial is not completely in the 'service area' of the National transmitter at Brookmans Park?"

You should be in the direct ray of the shorter-wave Brookmans Park, but your direct ray service may be locally

WHY IS HE SCREENED?



Little Mr. Y is right opposite the mouth of the tunnel but does not feel the wind! Read on this page about the "P.W." reader whose set was situated similarly.

shielded and you may, therefore, be owing something to the indirect ray. A wind may blow from the mouth of a tunnel as shown in my drawing. You (Y) may be behind a shield (S). The direct wind is not very strong, even though further away from the source of the wind, and outside the effect of the shield it may be stronger, and much further away weaker.

Thus you are in an area of direct ray in your house at Seven Kings, but you may be locally shielded. Even at this distance, the indirect ray is quite strong, and is, in your shielded position comparable with the (shielded) direct ray.

Works with No Grid Leak!

B. J. (Muswell Hill).—"While altering one or two details in my receiver the other day, I removed the detector grid leak from its holder and omitted to replace it before switching the set on. I was surprised to find that without the grid leak results were practically the same as with this in position. I do not know whether this effect is normal, or if it indicates a defect."

I recently explained to an Essex reader how the grid leak works, and I could refer you, therefore, to my answer to explain the first principles of leaky grid detection.

The fact is, it works by a leaky resistance. If the valve holder or the mounting which holds the grid leak, or the wiring on the grid condenser, or all together, have an insulation resistance of only hundreds of thousands of ohms, there's no theoretical need for a real resistance in parallel with this fortuitously provided leak!

So your leak is in the wiring on the valve holder or the—but I won't go through that list again! But this fortuitous leak varies with the damp in the atmosphere, the temperature, and what-not, so it's better to use the proper resistance always.

Would It Help?

A. A. R. (Cheam).—"When I recently shortened my aerial in order to get greater selectivity, I noticed a marked loss of signal strength. Could I still retain this improved selectivity and at the same time bring back my lost volume by increasing the number of wires in the horizontal span?"

No! Very unlikely!

Aerials can be "calculated" pretty exactly when one is dealing with supporting masts of insulating material and/or far enough away from the downlead, when there are no buildings or metal structures nearby, when the earth is made by a fan of copper spreading far beyond the confines of the area "shadowed" by the aerial, and so on.

But when it comes to a bit of wire strung up in a garden, with cisterns and lead pipes, telephone wires, and tramway conductors all round an earth half on to a gas-pipe and half to a water-pipe (which is touching a gutter) aerial calculation becomes a little difficult. Nevertheless, I answer your question firmly by saying, No! Very unlikely!

Separated Side-bands.

J. C. (Sheffield).—"When a transmitter, working on 300 metres, sends out a note of 1,000 cycles, it is said that the station actually radiates three frequencies: one of 999,000 cycles, one of 1,000,000 cycles

and one of 1,001,000 cycles. If three transmitters were installed, each radiating unmodulated waves of these frequencies, would a receiver tuned to the 1,000,000-cycle one reproduce a 1,000-cycle note in the loudspeaker?"

Surely it would. A side-band can be considered as a weaker station heterodyning with a stronger. It's the heterodyning of side-bands with the carrier and with one another which produces the complex sounds which are disentangled after rectification.

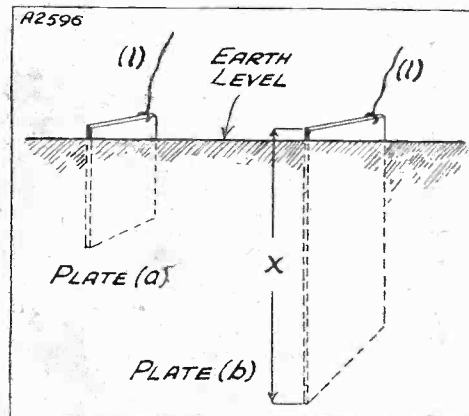
By the way, you will realise that to get a pure 1,000 note with the three transmitters there would have to be a very exact adjustment of frequency and phase, even, between the 1,000 transmitters to represent the side-bands.

In practice you would get, after rectification, 1,000 and 1,010, perhaps, because it's difficult to adjust frequencies to accuracies greater than one part in a hundred thousand.

About the Earth.

H. Q. (Colchester).—"I have been told to bury my earth plate as deeply as possible, and also to keep the earth lead as short as

BETTER BURIED



In both these cases the earth lead (l) is short, but obviously plate (b) is going to give better results than plate (a).

possible. I can't very well have a short lead to my earth plate if it is buried very deeply. Does this matter?"

In the vertical sections of earth I have shown the length (l) of the lead is in each case short, but plate (a) is shallowly buried; plate (b) is deeply buried. About 1 ft. 6 in. is enough, however, for dimension (x).

Leave the edge of the plate sticking above ground and make a good soldered joint to the wire. Do not bury this joint. The plate could be 16 gauge.

ONLY IN "P.W."

can you read Capt. Eckersley's replies to listeners' own problems.

AND REMEMBER—

Captain Eckersley's technical articles appear only in

"POPULAR WIRELESS"

and "MODERN WIRELESS."



All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

CAPACITY SWITCH FOR THE "COSMIC" THREE.

J. W. S. (E.C.1).—"What are the wiring connections running from the Cyldon Extender to the following points: Capacity switch, '00075-mfd. moderator condenser; '0003-mfd. fixed condenser and coil?"

The connections for putting a capacity switch into the original "Cosmic" Three are as follows. The moving vanes of the Extender go to the filament of V_1 and thus to all the points to which that terminal is joined. The fixed vanes of the Extender do not go direct to the '0003-mfd. fixed (grid) condenser and to "6" on the coil, as shown in the blue print of the "P.W." "Cosmic" Three.

Leaving these latter points joined together, you must connect them to one side of a new '0005-mfd. fixed condenser, and to one side of a new on-off switch.

HOW ARE YOUR RESULTS NOW?

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

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

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

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

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

Then the other sides of this new '0005 and of the new switch are joined together, and to the F terminal on the Extender.

In other words, the fixed vanes don't go direct to the same points as before, but they go through the extra '0005 condenser, which has a new switch wired across it.

All the other connections remain as before, so the '00075-mfd. moderator condenser has its fixed vanes connected to the top terminal on the moderator coil and to "3" on the short-wave coil.

The moving vanes of the moderator go to one self-changer contact and to "1" on the dual-range coil.

One side of the '0003-mfd. condenser goes to grid and to grid leak. While the other side goes to the new '0005 and new switch, as well as to "6" on the coil.

And, of course, the remaining terminals of the new condenser and switch go to the fixed Extender vanes, as stated.

Incidentally, remember to be careful not to make the new leads any longer than necessary. In other words, mount the new switch close to the F terminal on the Extender, and keep the '0005 new condenser near the switch.

A QUESTION OF SCREENING.

The following interesting letter from a Tonbridge, Kent, reader is reproduced below on account of the information it contains on a subject of considerable interest. Many thanks for it, R. C.:

Dear Sir,—On reading the query put forward by B. M. R. (Barnet) in "P.W." I think the following incident might help him to understand how masses of metal near an aerial (outdoor or frame) tend to shield it from radio waves.

I recently constructed the short-wave one-valve set described by W. L. S., and used it on medium waves in conjunction with a two-valve amplifier.

The whole contraption I took with me in a canoe on the river, and on putting up a small aerial between two sticks at each end of the boat, I received good, strong signals. Proceeding down the river, I had to pass under a metal bridge, and I noticed that when within 4 ft. of this, the signals faded completely out, but reappeared again the other side, showing the screening effect of the bridge, although it was a high one.

Another bridge constructed of wood had no effect whatever.—Yours faithfully, R. C.

DUPLICATED DIAL POSITIONS.

E. L. (South Wales).—"I have built the "Cosmic" Three, which is going very well, but there is one point I should like to be clear on, as regards to the short waves. I find that I tune the same stations on each of the two dial readings. Please can you tell me if that is as it should be."

Yes, this is quite O.K. and is no disadvantage at all.

MODERATING THE "MAGIC" THREE AND SIMILAR SETS USING PLUG-IN COILS.

In the original "Magic" Three, plug-in coils were used to cover the various wave-bands, the two coils in use on the medium waves being a reaction coil of about 35 or 50 turns, coupled to an X-type coil of 60 turns or so.

The latter coil was tuned by a '0005 condenser, connected across it, and the aerial lead was joined to this coil at one or other of the tapping points according to the selectivity required. Further adjustment of selectivity was obtainable by connecting the aerial to the A1 terminal, when a small condenser was placed in circuit, but usually this gave too great a reduction in strength for medium-wave

stations, as it was intended primarily for work on the short waves only.

Many readers seem to have found a difficulty in applying the moderator to this class of circuit (which has been outlined rather fully above in order to assist all readers who have similar arrangements to apply the moderating principle to these).

The best way to look at any such set, with a view to improving its selectivity, is first to note the simple aerial-earth circuit originally used.

Follow the paths of currents flowing between the aerial and earth by tracing the conductive pathway provided between aerial and earth terminals. You will immediately see that an untuned circuit is employed.

Coming in from the aerial terminal the current flows through a flex lead fixed to this, and via a clip to the plug-in X-coil. One

DO YOU KNOW—?

1. Which was the first B.B.C. station, and where it was situated?
2. Which of the Greenwich "Six Pips" indicates the exact hour?
3. The three ways of stating Ohm's Law?
4. The longest wavelength used for regular broadcasting?
5. The number of ticks per minute given by the B.B.C. interval signal?

THE ANSWERS ARE ON PAGE 320.

end of this coil is joined to the earth terminal, so the aerial currents simply flow through a certain number of turns of the X-coil, down to this end, and out via the earth terminal.

In doing so they introduce the aerial currents into the tuned circuit, because they traverse a portion of its coil. (The tapping points are merely a means to vary the proportion of aerial turns which can be included.)

To "moderate" such a set, first take the flex lead off the X-coil, leaving this latter to act simply and solely as a tuned-grid coil, which it will do without any further alteration of its connections. In future, instead of a direct tapped connection, it will receive its input from the aerial via the moderator coil, which will be placed close to it.

One end of the moderator coil, and one side of the moderator condenser must be connected permanently to earth. The other terminal of the moderator coil goes to the other side of the moderator condenser, and the aerial terminal is connected to one of the taps. And that is "all there is to it," so far as actual connections go.

To operate the arrangement you proceed as already described in "P.W." and by tuning the moderator condenser you first get greatly

TECHNICAL TWISTERS.

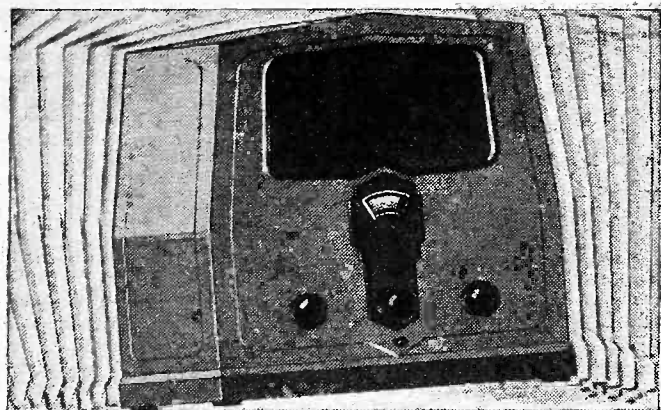
The missing words in last week's "Technical Twister," No. 113, were as follows: Interference. Nine. Common.

increased results in your new aerial-earth circuit. Then, by moving the moderator coil in relation to the X-coil, you can get any degree of selectivity you require between zero and maximum.

Find the position which gives a happy medium—it will only take a moment or two—and when the moderator coil is fixed there, you will find you get enormously increased power on the weak stations, and far better selectivity on the strong stations, by adjusting the moderator condenser as an adjunct to tuning

MODERATOR REPLIES IN BRIEF.

W. H. (Barrow-in-Furness).—The arrangements for moderating the "Titan" Four are (Continued on page 320.)

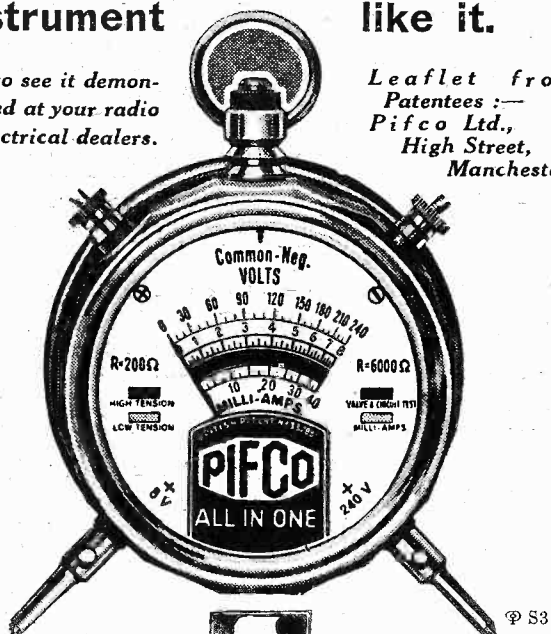


DISTORTION! **TRACK ITS CAUSE WITH** **THIS WONDER INSTRUMENT**

Don't **WONDER** what's the matter with your radio set. Get an "All-in-One" Radiometer and **FIND OUT**. Even the novice can trace any radio trouble in a few minutes with the "All-in-One" Radiometer. Tests everything. No other instrument like it.

Ask to see it demonstrated at your radio or electrical dealers.

Leaflet from Patentees:—
Pifco Ltd.,
High Street,
Manchester.



Standard Model for Battery Sets only. In dark maroon bakelite case (shown above.)



The SHERLOCK HOLMES of RADIO

De-Luxe High Resistance Model for Electric Receivers and Mains Units.

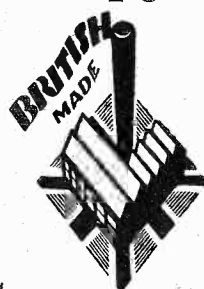
12'6

£2-2-0

PIFCO
ALL IN ONE
RADIOMETER



The Dubilier Type BB Condenser is a high-efficiency condenser in moulded bakelite case. Working voltage 200 D.C. (peak) test voltage 400 D.C. Capacities from .09 mfd to 4.0 mfd. Prices from 1/9



BUY THE
CONDENSER
WITH THE
NAME
YOU CAN
TRUST

DUBILIER
CONDENSER CO. (1925) LTD.,
Ducon Works, Victoria Road,
North Acton, London, W.3

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 318.)

the same as for the "Titan" Three, which have already been described.

H. B. (Birkenhead) uses a Colvern Dual-Range Coil in the Mullard "Master" Three, connected as follows:

No. 1.—To grid leak and condenser and fixed vanes of tuning condenser.

No. 2.—To moving vanes of tuning and reaction.

No. 3.—Left free.

No. 4.—To Aerial.

No. 5.—To H.F. choke.

No. 6.—To fixed vanes of reaction condenser.

In such a case disconnect the aerial from No. 4 terminal and "moderate" between aerial and earth. The connections will then remain as above except that No. 4 terminal will be left free. One end of moderator coil and one side of moderator condenser will be connected to "earth" (or to No. 2 terminal, which amounts to the same thing).

The other terminal of the moderator coil will be joined to the other side of the moderator condenser. And the aerial lead will also go to this point.

Then tune on moderator condenser as necessary, after the best position for moderator coil relative to the tuning coil has been found.

J. H. (Royton, Lancs.), M. W. A. (Brandon), and others.—See the reply to W. H. (Barrow-in-Furness). You will note that his connections are similar to yours.

C. H. C. (Rugby).—You might not find a great difference, but in the majority of cases there is an improvement found when the selector coil is removed and the moderator used instead.

MODERATING "EASY-CHANGE" 3.

A. A. (Blackpool), L. T. (Paisley), "Corkite," S. E. B. (Charlton), and others.—In the "Easy-Change" Three you can moderate between the No. 1 socket and the tapping on L3. Simply remove the present flex lead that joins these points, and connect a moderator coil and condenser there instead. i.e.: One side of coil and one side of condenser to No. 1 socket. And other side of moderator coil and of moderator condenser to earth terminal.

Then couple the coil to L3 and "moderate" as described in the articles.

U. R. (Gloucester).—"Moderating" is for improving medium waves, and as these are O.K. there would be no advantage in your case.

W. S. (Leytonstone).—With an S.G. valve you should not need it, and if properly connected, the coil units give good selectivity. Try a small (say .0001) variable condenser in the aerial lead instead.

R. D. R. (Horfield).—Afraid it is not practicable in your case.

"MELODY MAKER" (Tottenham).—Join

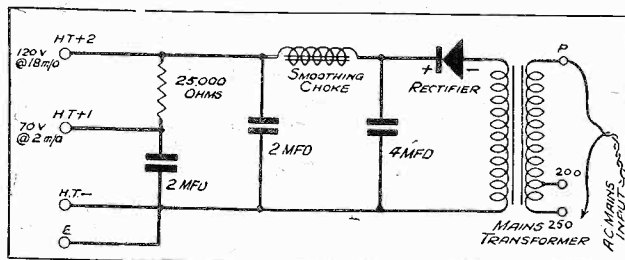
one terminal of moderator coil and moderator condenser to earth. Join second terminal of moderator coil and condenser together.

Disregard aerial terminal A, instead take aerial lead, to second terminal on moderator coil. Then tune as necessary and shift the moderator coil closer to the medium-wave winding until best position for it is found.

G. W. (Burgess Hill).—You can moderate by disregarding aerial terminal, taking aerial lead to tapping terminal on moderator coil instead. Other connections for this are same as in reply above. When complete place the coil near the medium-wave plug-in coil, and proceed as described, by tuning and altering coil position if necessary.

C. B. (Acton Vale); S. T. (Walmer Road); W. B. (Newquay); T. G. D. (Edgbaston); H. W. A. (S.E.8); A. W. F. (Homerton); H. T. (Woodham); C. S. (Southampton); B.

MISSING LINKS No. 34 AN A.C. H.T. UNIT.



This is the complete diagram of the arrangement shown last week. It will be seen that the "missing" items were the rectifier and the 4-mfd. smoothing condenser.

M. E. (Sevenoaks); R. L. (Bideford); H. C. T. (Port Vale); S. W. (Newport); E. G. D. T. (or E. G. T. F.) (Birkenhead); T. T. (near Watlington); "Astor" (Woodham Ferris); and R. B. C. (Leicester). Your set is unsuitable.

A. W. H. (S.E. 25).—The easiest way would be to take the aerial off A and ignore that terminal on the coil unit in future. Instead, connect one side of moderator coil and of moderator condenser to earth.

Then join the other side of moderator condenser to the lead from aerial and take this dual lead on to the other moderator coil terminal.

You will probably have to experiment rather carefully with the position of moderator coil in relation to the unit.

T. L. E. (Preston).—Yes, but try the different taps as well.

"CHARLIE" (Reading).—Use flex leads and experiment with different positions until the best is found, and then fix the coil there.

FOR THE SHORT WAVES.

G. D. M. (Bradley, near Bilston).—"Could you tell me if the 'Magic' Three set is suited for short-wave reception without the use of an adaptor? If so, what kind of wire should I use to make the required coils, the diameter of the coils, and the approximate number of turns per coil? Will the circuit require any alterations?"

The "Magic" Three—like the famous "Cosmic"—was designed with a view to effective work on the short as well as on the medium and long waves, so no

adaptor or alteration in wiring is necessary. But whereas with a "Cosmic" the change to short waves is done merely by a switch, the "Magic" needs a set of short-wave plug-in coils.

Such coil sets are usually made of stiff, bare, self-supporting wire (gauge about No 14 or 16), and consist of three or four coils. A good selection is a 2, a 4, a 6, and an 8, the numbers denoting the number of turns, spaced about 1/2 in. apart. The diameter of the coils is about 3 in., and the 2-turn coil is nearly always used in the aerial holder, the others being interchanged, as desired.

TOO MANY VOLTS?

D. W. (Ilford).—"I am writing in fear and trembling, because I am very much afraid that you are going to tell me to alter my set—or, rather, my mains unit! This is the position.

"When I shifted into a house with direct current mains, I made up my mind that I would finish with buying H.T. batteries, and I went into session with a friend of mine in the electricity line to make me a first-class, hum-free, high-voltage, steady current, safe, mains unit.

"All the condensers were high-test voltage, all the resistances were worked out to a hair's breadth by him, and when we put the set on I nearly wept with joy at the really first-class results we had. The volume was simply grand, and there was not the slightest trace of hum, even when the programme was off, and even when the set was not tuned to any station at all. It was almost too good to be true.

"I was so pleased with it that some time later I mentioned it to a neighbour, who asked if I would mind him measuring the voltages across it so that he could work out a similar scheme for his set. And his voltmeter, which he swears is a good one, shows that instead of 120 volts, which is the maker's maximum for the valve, I am getting 140 volts on the plate.

"Will it shorten the valve's life? Have I got to alter my beautiful eliminator, or do you think that 20 volts extra on 120 does not matter? I am very much afraid you will say it will."

It does seem a shame to have to alter it, and in your case we should be very much inclined to take a chance on it and leave things as they are, remembering that the modern valve is a very hardy and robust piece of mechanism, and it is quite possible that the extra 20 volts is not doing it an ounce of harm.

THE ANSWERS

to the questions asked on page 318 under the heading "Do You Know—?" are as follows:

1. London, 2 L.O. It was erected on the top of Marconi House, Strand, W.C.2. 2. The last. 3. E. E. E. E.

$I = \frac{E}{R}$; $E = I \times R$; $R = \frac{E}{I}$

where I = current in amps. E = volts and R = ohms. 4. 1,935 metres, used by Kaunas (Lithuania). 5. Sixty per minute.

You must be careful, however, not to let the grid-bias battery deteriorate, for if this happens the extra voltage would certainly be detrimental. And, anyhow, it should be a simple matter to "drop the voltage" if necessary. Remember, that even if the resistances inside the "eliminator" are not of the plug-in kind, which are easy to alter, it would be quite possible to drop the voltage to the last valve by a resistance added externally.

You can work it out very easily by Ohm's Law, $R = \frac{E}{I}$ where R is the resistance, E is the voltage, and I is the current.

The current in question will, of course, be the anode current taken by the valve at 120 volts, which will be the current flowing through the added resistance under the new conditions. And the voltage will be the voltage across the resistance; that is to say, the voltage which will be "dropped" between the mains unit and the set.

To make it clear we will take a typical case where it is desired to drop 20 volts, as in your own case, when the current to be passed under the new conditions is say 10 milliamps.

Ten milliamps is .01 ampere, but as that is rather an awkward figure to work with, you can put down the milliamps and get your answer in thousands of ohms, instead of ohms, so that stated in this way the

problem becomes $R = \frac{20}{.01} = 2 \text{ thousands of ohms.}$

Thus, in the case we have taken, 2,000 ohms would be required to drop the 20 volts and reduce the voltage at the plate to 120,

"P.W." PANEL, No. 72. PREFIXES.

Owing to the widely varying range of units of resistance, capacity, inductance, etc., used in radio work, it is customary to denote quantities by the aid of prefixes.

Thus the prefix "kilo" denotes "multiply by 1,000," and "milli" denotes "divide by 1,000."

Examples, 2 kilowatts = 2,000 watts, 5 milliamps = $\frac{5}{1000}$ amp.

Similarly the prefix "Mega" (or "meg.") denotes "multiply by 1,000,000," and "micro" denotes "divide by 1,000,000." Examples, 2 megohms = 2,000,000 ohms and 20 microvolts = $\frac{20}{1,000,000}$ volt.



WHEN YOU HAVE BUILT

Your Set, are you always satisfied that it is pulling in all it should.

You can make certain, if it is fitted with Six-Sixty Valves because your nearest Six-Sixty Valve Service Station will be pleased to help you to get the best results.

Six-Sixty Valve Service Stations also give straight advice without obligation on all valve problems.

Write to us for the address of your nearest Six-Sixty Valve Service Station and consult them on all your radio requirements.



Advt. Six Sixty Radio Company Ltd., Six-Sixty House, 17/18, Rathbone Place, W.1.



THIS COMPONENT SPECIFIED in 'OUTDOOR' 3

IN their "Quality, not quantity" Policy, "P.W." experts are concentrating more than ever on perfecting each circuit published—and still Sovereign Components are specified. Proof again of Sovereign quality. A Sovereign H.F. Choke is specified in the "Outdoor" 3, and if you substitute this component you run the risk of failure in performance and results. If you use Sovereign as much as possible you are assured of success. Make this a Sovereign set too. The specification is your guarantee!

In other sets constructors are already finding the Sovereign Varo-Choke invaluable. The latest contribution by Sovereign to Radio Progress costs only 3/6. Make certain you know about it before building your next H.F. or S.G. Set.

Senior Type H.F. Choke from all dealers. 3/6

The Sovereign Catalogue should be in every constructor's possession. Make a copy, too.



SOVEREIGN

SOVEREIGN PRODUCTS LIMITED,
52/54, Rosebery Avenue, London, E.C.1.

MAINS RADIO COSTS SO LITTLE



10/-


DOWN AND BALANCE IN EASY MONTHLY PAYMENTS

Model D.C. 15/25. Alternative Outputs of 15 and 25 m/A. **39/6**

... There's only one way to enjoy the reliability, power and economy of Mains Operation on your existing battery set. Get an "ATLAS" MAINS UNIT, the expert's way to Better and Cheaper Radio, and winner of the Olympia Ballots in 1930 and 1931.

An "ATLAS" Unit is fitted in a few minutes without alterations to set or valves, cuts running expenses to less than a penny a week, and is guaranteed for 12 months.

Ask your dealer for a demonstration and send coupon for FREE BOOKLET "Power from the Mains."



D.C. Models from 39/6.
A.C. Models from 52/6.
Or with L.T. Tackle Charger from 77/6.
Westinghouse Rectifiers.
Guaranteed 12 months.
Special Models for the "S.T.300" Receiver.
A.C.244/S.T. ... 59/6.
A.K.260/S.T. ... 90/-.

CLARKE'S "ATLAS" MAINS UNITS

H. CLARKE & CO. (M/CR.) LTD., OLD TRAFFORD, MANCHESTER.

Phones: Trafford Park 1744-5-6.

Southern Offices: BUSH HOUSE, W.C.2. Phones: Temple Bar 3862 and 7130.

POST THIS COUPON NOW!

H. CLARKE & CO. (M/CR.) LTD., Old Trafford, Manchester.

Please send me FREE copy of your Booklet, "Power from the Mains."

Name.....

Address.....

30/21/5

THE LISTENER'S NOTEBOOK

(Continued from page 310.)

his purpose is achieved, then he will have given the death-blow to the wintering-abroad habit.

I hope Mr. Mais will be given another series of the like to do next winter, and if I might suggest a subject, let it be "Our Known Island." In such a series I venture to predict as many revelations as the last provided, for is it not a fact that our acquaintance with many of our popular resorts doesn't extend beyond the bandstand or the pier?

I was impressed with the note of calm dignity that characterised the B.B.C.'s tribute to the assassinated President. Although our announcers don't always pass muster—they have actually been guilty of saying lor and awda (disgraceful!)—there's no doubt that when tributes have to be paid, they do rise to the occasion, especially he whom we have come to regard as our premier announcer.

One recent high-light was, in my estimation, "Dr. Abernethy" (pronounced Aberneethy, if I had my way). I didn't hear it when it was first produced some time ago, so cannot make comparisons. I am told, however, that Mr. Gordon McLeod, in the title rôle, wasn't as successful as his predecessor.

In view of Mr. McLeod's convincing performance, this is hard to believe. I liked, too, the delightful way the rest of the cast played up to the one central figure, to the obvious advantage of the latter.

I have at last heard the cuckoo! He was in a very persistent mood, which almost exhausted my patience. I stuck him out, however, and was rewarded with a medley of songs beginning with "Little Brown Jug" from some foreign station. He then faded right out.

Another powerful station to find an outlet through my loudspeaker is Poste Parisien. Needless to say, this pleases me, for a wider field of alternatives, particularly when they offer bright entertainment, can supply the toning corrective that weary listeners sometimes need.

In "Miscellany" there was an attempt at something different, which isn't to be despised. The item was a very meaty affair, calling for the full exercise of our digestive powers. In fact, I thought these powers were rather overtaxed. The reciter's whisper, by the way, was strangely reminiscent of that ghost-like voice which, with a piano, used to help some while ago, in a stop-gap capacity.

What a prolific output of really tuneful dance music there has been of late! Time was when only one such tune was sandwiched between long stretches of uninspired rhythmic noise. Happily, this fashion has gone, and all bands (with one exception, perhaps) seem to like the pretty-pretty nowadays. I wonder how far Henry Hall is responsible for this.

A band that is now well to the fore of first-class bands is Bertini's, of the Winter Gardens, Blackpool. For consistency and freshness he hasn't a rival in my opinion.

I always make a note of his broadcasts, never fail to listen-in, and am never disappointed.

The Palladium relay was good, and above the usual standard of music-hall relays. It was interesting, too, as a revelation of the limitations of wireless.

To anyone who has never seen Miss Cicely Courtneidge a good deal of her comedy must be lost. To those who have, imagination would supply the deficiency. One could picture her, for instance, in "The Fairy Queen," in net and spangles, bidding her fairies to her aid—and it was a funny picture, too. She seemed to convulse the Palladium audience, and such laughter is always infectious.

Of course, she sang "The King's Horses," but this is the sort of song that takes some killing. "Laughing Gas"—also heard before—justified the repetition, judging from the way the audience received it. Altogether a riotous half-hour.

I didn't see the need for the added feature—the community singing—in a vaudeville programme with such artistes as George Gee, Ethel Levey, Stainless Stephen, and Elsie and Doris Waters. Surely such people are all-sufficient in themselves!

On the other hand, I can think of many other bills which would have appreciated Mr. Lewis' help. It would be invidious to single out for praise any particular turn from such a strong cast. They were all first-class. That was the best Saturday night we have had for some long time.

Special Whitsun Holiday Issue...

This week's issue of ANSWERS is a Special Whitsun Holiday number, packed with a record programme of holiday features, including

"SECRETS OF MY LETTER-BAG,"

BY

GRACIE FIELDS

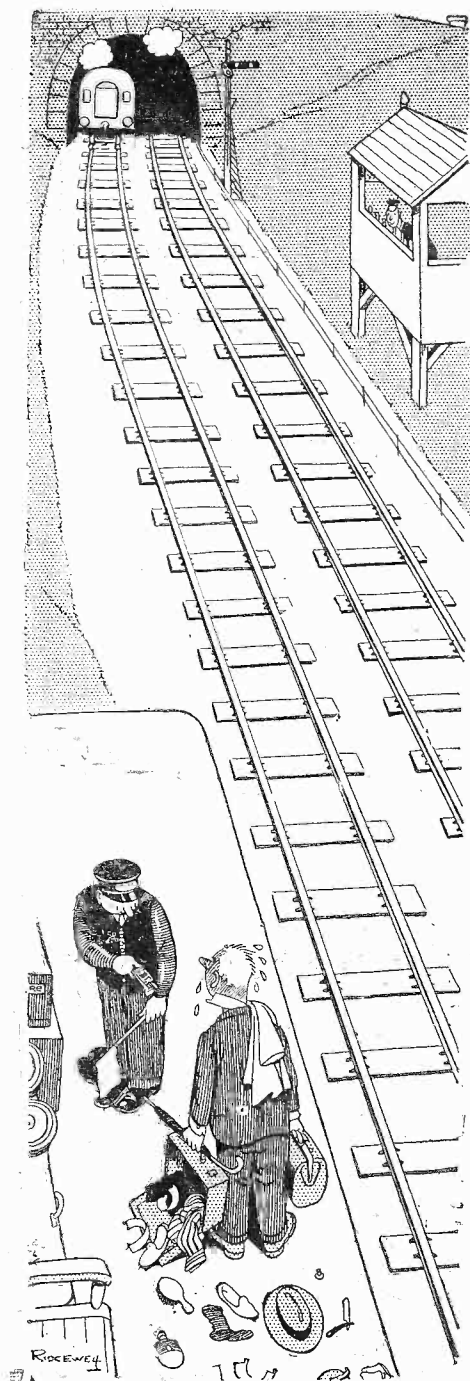
and, an article by Commander the Hon. J. M. Kenworthy. There is, too, a wonderful "three prizes in one" holiday competition offer of

A Saloon CAR £100 CASH and £2 A Week for a Year!

which must be won for a phrase. Or the winner may take £350 cash down. And there's £1,000 must be won in a "quick result" picture contest as well! Make sure of your copy of

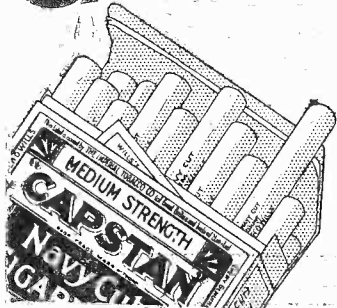
ANSWERS

Buy Your Copy TO-DAY - 2d.



Never mind—have a
CAPSTAN

they suit
everyone



6^d FOR 10
11½^d FOR 20

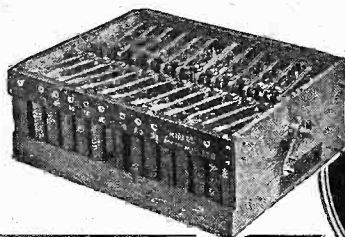
Further Splendid Testimony

to the **PROVED** Excellence of—

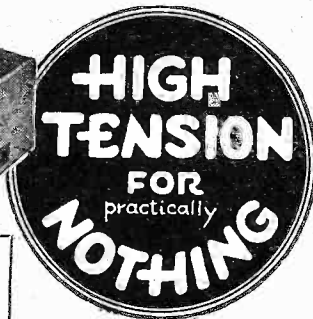
MILNES H.T. SUPPLY UNIT

This Unit gives better and smoother results than an Eliminator, or direct working from the mains.

THE Unit consists of indestructible nickel iron cells which are kept charged automatically from the L.T. accumulator—by means of a series-parallel switch—thus supplying a steady and ample stream of H.T. Current. The L.T. Accumulator will require very little more charging than formerly. It seems too good to be true—but, nevertheless, it is. Absolutely abolishes H.T. worries. The "Alklum" nickel and iron plates are entirely free from the trouble customary with lead plates. Sulphation is impossible and cells cannot be damaged by any rate of charge or discharge. Will supply 40 milliamps.



Many People have already scrapped their **ELIMINATORS** in its favour.



90 Volts £2.18.0
120 Volts £3.16.0
150 Volts £4.14.0

In the United Kingdom.

Write To-day for Full Particulars:—

MILNES RADIO CO.,

Aire Works, Cottingley Bridge, BINGLEY—YORKS. Phone: Bingley 500

LET YOUR LOW-TENSION ACCUMULATOR PROVIDE YOUR HIGH-TENSION CURRENT—

42 Hoxton Street, Gillingham, Bradford.
9th February, 1932.

Messrs. Milnes Radio Co.,
Cottingley Bridge, Bingley.

Dear Sirs,

I think it is about time I sent you a line to let you know how the H.T. Unit is going on. Just fancy, I shall have had it four years next June.

I have had a set since 1924. The first four years was one long trouble and expense with wet and dry batteries. Since buying the Milnes Unit, it has been splendid to have nearly four years of comfort, and, after the first cost, no expense to speak of. Five shillings has been the cost during the whole time I have used your Unit. For the last twelve months the cost of upkeep has been 3½d. per week.

I've never found running your H.T. uses any more from the accumulator than when I used dry or wet batteries. All I know is—it's a splendid addition to any set, and would not like to use any other.

Well, I cannot write enough in its praise. If this note is of any use to you, use it by all means, every word is true.

I am, Yours faithfully,
G. N. BATT.

MAN WHAT A SHAVE!



SEVEN DAYS FREE TRIAL

To Euthymol, Dept. 125D, 50 Beak Street, London, W.1.

Please send **FREE SAMPLE** Shaving Cream.

Name

Address

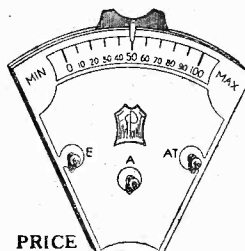
(Use block letters please)

PARKE-DAVIS Shaving Cream

Made by the makers of Euthymol Tooth Paste

You will always shave with Parke-Davis Shaving Cream, the new perfected softener for stubborn beards, if you accept a week's supply of it free. The razor feels as though it has no edge, but it makes the face satin smooth. Large tube 1/6, from chemists.

THE WONDER INVENTION of 1932



The "FIVE POINT"

definitely eliminates jamming and brings to your set the foreign stations you've been waiting for.

IT IS A

**STATION SEPARATOR
DIFF. VOLUME CONTROL
AUTOMATIC CUT OUT
ONE GRADUATED SCALE
AND A LIGHTNING PROTECTOR.**

PRICE

2/-

with clips for mounting direct on your cabinet.

Obtainable from your Local Dealer, or direct

FIVE POINT PRODUCTS, 8a, Cross St., ISLINGTON, N.1.

Trade enquiries invited.



Celfix

Simply bind it round IT FIXES ITSELF!

IT HAS 1,001 USES.

Ideal for Radio Insulations. Invaluable to the Electrician—frayed ends made tidy and insulated. Useful for the car—not affected when washing down. Perfect for the golf club and tennis racket. In the home, round the handle of your kettle, it is heat-proof.

IDEAL FOR WIRELESS



From your Dealer or
Post Free 1/- from—

K. ROOKE BROS., LTD.
32, Queensway,
Ponders End, Middlesex.

Now **EVERYONE** can afford **SUPER RADIO!** *The NEW Range of TUNEWELL COMPONENTS is Ready!*

8
FREE
CIRCUITS

The NEW TUNEWELL Components set a standard of quality hitherto approached only by the highest priced products. Unless huge sales result, TUNEWELL prices must advance, but already the demand has made us confident of the success of our effort to bring Super Radio within everybody's reach.

The NEW TUNEWELL Components cover a wide range; Coils, Chokes, Transformers, Resistances, Volume Controls, Mains Components and Eliminators, etc., etc. Whatever the Set, there are TUNEWELL Components to improve performance. Insist on them always.

Should you have any difficulty in obtaining, please write us giving the name and address of your nearest dealer.

In any case send the coupon for the NEW TUNEWELL "Guide to Super Radio," an interesting folder which you will keep for reference.

★ 8 FREE Blue Prints

including Band Pass All Mains Three and Kit Eliminator.

TUNEWELL RADIO LIMITED,
54, Station Rd., New Southgate, London, N.11



TUNEWELL

Post this NOW!

Post in unsealed envelope—halfpenny stamp.

To TUNEWELL RADIO LTD.,
54, Station Rd., New Southgate, London, N.11
Send New "Guide to Super Radio" to:

Name.....

Address.....

My nearest Dealer is.....

P.T.

MORE NOTES FROM THE NORTH

By Our Northern Correspondent

NEARLY all the plans for summer broadcasting in the North Region which were dealt with by the North Regional Director, Mr. Edward Liveing, in his broadcast talk recently, have already received publicity in POPULAR WIRELESS. Mr. Liveing mentioned, however, that in addition to the resorts named in my recent "Notes from the North," arrangements have been made to relay during the summer the Llandudno Orchestra playing at the Pier Pavilion, Llandudno. This is the first time that arrangements have been made to broadcast this orchestra.

An interesting broadcast referred to by Mr. Liveing will be on June 25th, when the new motor liner "Georgic" will sail on her maiden voyage from Liverpool. Some years ago the North Regional stations gave a very interesting broadcast of the departure of the "Britannic" on her maiden voyage, but this time plans of an even more unusual character are being made.

A New Wave for Newcastle.

Mr. Liveing mentioned that it had been definitely decided to give to the Newcastle transmitter a wave-length of 211 metres. POPULAR WIRELESS readers will perhaps recall that when the Newcastle transmission trouble first arose on the opening of the North Regional station over a year ago, I suggested that the B.B.C. should give the Newcastle transmitter the 200 metres wave-length, which was free owing to the closure of the Leeds transmitter.

The idea was turned down by the B.B.C. on the grounds that the wave-length was too short and would restrict the area covered by the transmitter as well as causing listeners some difficulty in getting low enough in wave-length on their receiving apparatus.

Instead, Newcastle was placed on the National common wave-length and forced to relay the National programme, producing the ludicrous result that programmes produced in the local studio could not be transmitted from the local transmitter but had to be radiated from the North Regional transmitter at Moorside Edge.

OFFICIAL "P.W." EXHIBITORS.

Readers are reminded that further information regarding the components for the "Outdoor" Three can be obtained from official "P.W." exhibitors who also display P.W. "Cosmics" etc. The latest additions to the list of Exhibitors are given below.

LONDON.

C. H. Appleton, 74, Upper Clapton Road, CLAPTON.
S. T. Corry & Co., 52a, Southampton Row, W.C.1.

BIRMINGHAM.

Messrs. Wallace & Co., 856, Bristol Road, Selly Oak.

COTTERIDGE.

Messrs. Wallace & Co., 1839, Pershore Road.

NOTTINGHAM.

Mr. Pickbourne, 93, Smeinton Boulevard.
Reliance Engineering Co., Theatre Quadrant.
Reliance Engineering Co., 101, Alfreton Road.
Reliance Engineering Co., 144, Derby Road.

READING.

G. Wilson, 45, Castle Street.

TORQUAY.

S. J. Searle, 33, St. Marychurch Road,

SAFETY FIRST

The Ealex testing Prods., improved type. The points can be fixed in the "out" position, if required, by a sharp turn. For testing sets



with intricate wiring, they prevent short circuits and save you money in replacements.

PRICE **3/6**
Per pair
Red and Black.

BYLDURONE CABINETS

A Byldurone Cabinet! So easy to construct—only a screwdriver required. Supplied complete, ready to put together. Handsome yet sturdily built—Byldurone Cabinets will give an added charm to your customers' radio.

Specify BYLDURONE Cabinets

Their distinctive coverings can be supplied in an extensive range to suit individual taste, and to harmonise with furniture style and colour schemes.

Write for List A21.

J. J. EASTICK & SONS

Ealex House, 118 Bunhill Row, London, E.C.1

Telephone: Metropolitan 0314/5/6.

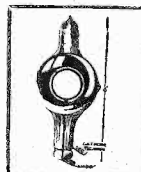
FREE A Luxury Wireless Set

or components of equivalent value

Wonderful offer to introduce the Radialaddin Club. Write for particulars

Dept. P.W., 47/48 Berners Street, London, W.1
Museum: 1821

Photo Cells



are now well known for their use in commercial as well as scientific work. For sound films, television, invisible ray, colour comparison and photometry. Counting and timing of passing objects such as cartons travelling on endless belt to packing room, motor cars through a tunnel. Timing the velocity of a projectile or speed of races; transmission over a beam of light; illumination control, burglar alarm, measuring photographic plates,

pyrometry, smoke detection, storm and sunshine detectors.

The usual price of these cinema photo cells is £5; and they are guaranteed in their sound to light responses. Most fascinating experiments may be made with one of these and your radio set. Illustrated Leaflet with each.

ELECTRADIX RADIOS,

218 Upper Thames Street, London, E.C.4.

Telephone: CITY 0191.

15/-
as illustrated.

25/-
mounted.

THE PICTURE PAPER WITH THE
MOST NEWS
SUNDAY GRAPHIC
and Sunday News

TECHNICAL NOTES

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

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

"Straight" Curves.

ALTHOUGH we speak of the "straight" part of the characteristic curve of a valve it is very doubtful whether any part of the curve is really absolutely straight. I think it simply amounts to a question of the scale on which you draw out the curve.

Some little time back, when I was intimately connected with valve manufacture. I must have plotted the curves of hundreds of valves of all kinds and makes and I believe that the "straight" part of the curve is always a slight bend, in some cases slighter than others, but nevertheless a bend and not absolutely straight.

Incidentally, this accounts for some of the shortcomings of certain types of valves, especially if the departure from the straight is at all appreciable. I daresay you know that the screen-grid valve, notwithstanding its extraordinary amplification and the wonderful advances it has made possible in portable receivers and in high-frequency amplification generally, is still far from being perfect.

Sometimes you get an effect known as cross-modulation, whereby two stations having wave-lengths very close together become difficult if not impossible to separate: this effect is due to the absence of straightness in the "straight" part of the characteristic curve of the valve.

A great deal of work on the part of valve designers has been naturally devoted to this question and set designers have endeavoured to cope with the slight imperfections of the valve by making corresponding allowances in the arrangements of the circuit. But there is still room for a good deal of improvement.

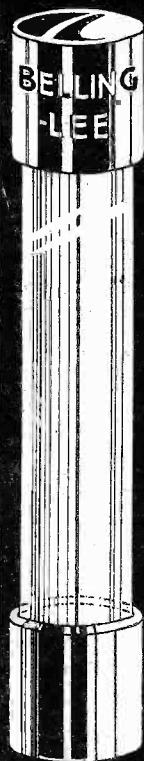
S.G. Improvements.

Nevertheless screen-grid valves to-day are very much better than those even of a year ago. Not only are the characteristics better but the screening has also been much improved. This means that bigger amplification can be obtained without instability setting in.

It also has an effect upon the tuning, which is rendered easier. The actual amount of screening varies considerably in different valves and you can easily verify that the capacity between grid and anode, even of different specimens of the same make of valve, will vary considerably. The value of this capacity is very small, and its effect

(Continued on next page)

WHEN IS A FUSE NOT A FUSE?



MAINS FUSE H.T. FUSE

—WHEN IT IS SO LONG that its resistance couples together the circuits which it protects, making the set unstable.

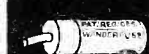
—WHEN IT IS TOO SHORT to check a powerful surge of current, allowing it to 'arc' across the end-caps instead of ceasing when the fuse wire melts.

Belling-Lee fuses are made in two lengths, for safety and efficiency; $\frac{1}{2}$ " long for H.T. and G.B. circuits (60 m/a, 150 m/a and $\frac{1}{2}$ -amp.); $1\frac{1}{2}$ " long for mains leads (1, 2 and 3-amp.), shorter fuses being unreliable with mains voltages. SPARE FUSES, all ratings 6d. each.

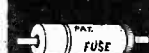
FUSE HOLDERS



2/6 SAFETY TWIN



1/4 WANDER FUSE



1/4 FLEX LEAD



1/4 SINGLE BASEBOARD

BELLING-LEE
FOR EVERY RADIO CONNECTION

Adver. of Belling & Lee, Ltd., Queensway, Ponders End, Middlesex



7 INSULATED COPPER STRANDS FOR BIG VOLUME!

You cannot possibly realise the capabilities of your set until you have tried "Aerialite," the new weatherproof, insulated, all-copper Aerial. Subjected to the most exacting tests by experts throughout the country, "Aerialite" has yielded amazing results over the now ineffective steel and copper type.

Fit "Aerialite" to your set and notice the difference. Made and guaranteed by "AERIALITE" CO., 10, Amber Street, MANCHESTER.

Pioneers of Copper Insulated Aerial.

"AERIALITE" The WEATHERPROOF INSULATED ALL-COPPER AERIAL
(PATENTS PENDING)
Factors please enquire. Avoid imitations.

EASY TERMS

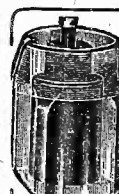
WE supply all good quality Radio Receivers, Components and Accessories on deferred terms. We carry adequate stocks and can give PROMPT DELIVERY.

12 EXIDE W.R. HIGH-TENSION ACCUMULATORS (120 volts, 5,000 m/a). Large capacity type. Cash Price £3 15 0 Or 5/- with order and 10 monthly payments of 7/10. Carriage charged on all orders from Scotland. This is the best and cheapest form of High-Tension supply where the Electric Light Mains are not available.

Send list of requirements, and quotations will be sent by return. Price list FREE on request.

LONDON RADIO SUPPLY CO. (ESTABLISHED 1925).
11, OAT LANE, NOBLE STREET, LONDON, E.C.2
TELEPHONE: National 1977.

HEADPHONES. Sullivan's Double. 2 receivers with metal headbands, 120 ohms, 3/-; ditto, 8,000 ohms, 4/- pair; field service 'phones, leather headbands, L.R., British, 2/6 pr., in makers' cartons; single earpieces, L.R., 1/6; all as new, guaranteed 2 yrs.; microphone insets 2/-, 9lb. Parcel useful odds and ends, 6/-, post free. Electradix Radios, 218, Upper Thames St., E.C.4.



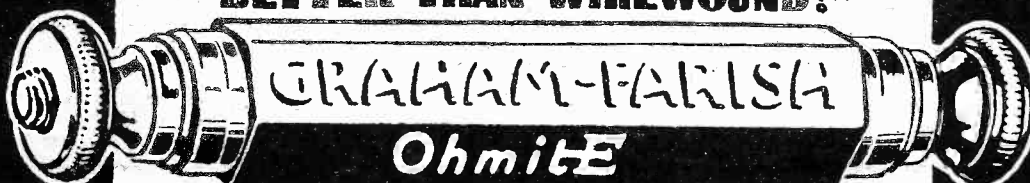
WET H.T. BATTERIES

Solve all H.T. Troubles. SELF-CHARGING, SILENT, ECONOMICAL JARS (waxed), 2 1/2" x 1 1/4" sq. 1/3 doz. ZINCS, new type 10d. doz. Sacs 1/2 doz. Sample doz. (18 volts), complete with bands and electrolyte, 4/1. post 9d. Sample unit, 6d. illus. booklet free.

Bargain list free. AMPLIFIERS, 30/-, 3-valve set, £5. P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON

"OHMITE" RESISTANCE

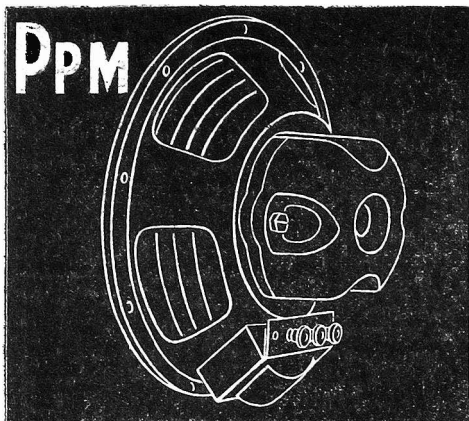
ALL values from 300 ohms to 5 megohms 1/6 Holder 6d.



"BETTER THAN WIREWOUND!"

GRAHAM-FARISH
Ohmite

Made by
GRAHAM FARISH
Bromley Kent.



**These two letters
prove all we
have said about
the PPM**

" . . . how jolly pleased I am with your P.P.M. . . . I am getting £6 6 0 results. . . It is doubtful if I shall ever consider buying a new loudspeaker, but it will be a Celestion if I ever do."

"I must write and congratulate you on having produced such an excellent moving-coil speaker. . . I am agreeably surprised at the result. . . it gives me fully 25 per cent. more volume."

Here is additional proof that the wonderful P.P.M. is, without doubt, the finest moving-coil speaker obtainable. Listeners who are contemplating changing their speaker, and are desirous of getting the finest possible results, should not fail to have a demonstration of the P.P.M. at their local dealer before finally making their decision. Price 47/6, including transformer; or by easy payments, 10/- down and six monthly payments of 8/-.

When ordering please state whether standard or pentode transformer required.

**PPM
INCLUDING TRANSFORMER**

47/6

CELESTION
The Very Soul of Music
LOUD-SPEAKERS

CELESTION LTD., London Rd., Kingston-on-Thames.
London Showrooms: 106, Victoria St., S.W.1.

TECHNICAL NOTES

(Continued from previous page.)

depends very much upon the type of circuit with which the valve is used, but in some cases it makes quite a difference.

Power-Grid Detection.

I said something in an article in "P.W." a little time back about power-grid detection, and as this seems to be of interest to a good many readers I think it may perhaps be useful to give you a word of warning with regard to the actual current consumption on this system.

If you use high-tension dry batteries you want to take care that these are not heavily overloaded. Another point you want to watch is the coupling transformer, as this also may be badly overloaded if the current is excessive.

If we are using a medium impedance valve as the detector and a fairly high voltage, say 120 or 130, you will have perhaps as much as 8 or 10 milliamps passing through the valve. Apart, as I say, from the drain upon the high-tension battery, this heavy current may mean that the coupling transformer is working under very adverse conditions.

When it is passing a current of, say, 2 or 3 milliamps, it may be perfectly satisfactory, but if the current becomes too high the inductive value of the transformer may be so altered that the whole receiver puts up a very poor show. Excessive anode current here, may, in fact, completely alter the frequency-amplification curve.

There is also the question of burning out the transformer to be considered, but I do not think that it is very likely to happen. It is not so much a question of any danger of actual breakdown of the transformer, so much as working it under adverse conditions. So you want to remember to have mercy on your transformer and high-tension supply when you are going in for power-grid detection.

Push-Pull and Grid Bias.

When using a pair of valves in a push-pull amplifier arrangement you may either use a single grid bias for the two or you may have separate grid bias for each valve. With old types of valve this separate arrangement of the bias was not so important, but with the modern and more efficient valve having a relatively high slope it becomes quite a matter of importance to have precisely the right bias and, inasmuch as the two valves will certainly differ, however slightly, from one another, it is really a great advantage to have separate bias for the separate valves. The bias should be properly adjusted so that the anode currents through the two valves are the same.

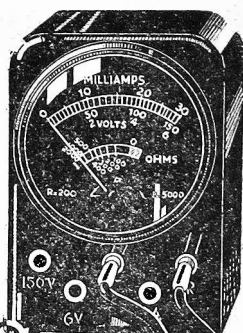
Using Tapped Transformer.

This can be arranged by using a tapped input transformer of which the secondary is tapped into two parts, one part to each of the two push-pull valves. The two parts of the transformer secondary are tapped separately on to a grid-bias battery so that the amount of grid bias applied to each of the grids of the push-pull combination is separately adjustable. In adjusting the grid bias a milliammeter should be used in the anode circuit so as to indicate the current flowing, and the bias should be

(Continued on next page.)

**EVERY
LISTENER
NEEDS
ONE**

**WATERS
BRITISH METERS**



WATERS UNIVERSAL METER offers every listener the simplest means of keeping reception perfect. No skill required. It tests voltages, milliamp consumption, valves, transformers, coils, condensers, short circuits, resistance values, distortion, connections, etc. Four readings on one dial: (1) 0-150 volts for H.T.; (2) 0-6 volts for L.T.; (3) 0-30 milliamps for current consumption; (4) Resistance test 0-2,000 ohms. Of all dealers or direct, including special 4-page instruction leaflet **12/6**

WATERS 3-in-1 POCKET METER 8/6
L.T. (0-6v.), H.T. (0-150v.) and 0-30 m.a.

Two-range Volt Meter, 0-5 v.; 0-120 v. 6/-

Of all Radio dealers or direct from us. Explanatory leaflets post free.

STANDARD BATTERY CO.,
184-8, Shaftesbury Ave., W.C.2

DON'T RISK IT!

Lightning strikes through wireless aerials. Make your home safe!

No need to switch off. Listen through the worst of storms.

Fix a 'Gard' between Aerial and Earth lead-in. Does not affect reception, but provides constant and absolute protection at all times against lightning and static interference. From all Radio Dealers or Post Free from GRAHAM FARISH, BROMLEY, KENT.

GARD
TRADE MARK
Patent Applied For

POST FREE
1/6

ENGINEERS—IMPORTANT NOTICE.
The 19th Edition of "ENGINEERING OPPORTUNITIES" is now ready for distribution. This is not merely a pamphlet, but a 200-page book of unique reference that you cannot well afford to miss. By reading it you will know us, our work, our aims and how we can alter your entire outlook and earning power, whatever your age or experience. Among other things, the Handbook shows the easiest way of preparing for B.Sc., A.M.I. Mech. E., I.E.E., G.P.O., etc., Exams., outlines Modern Home-Study Courses in all branches of Civil, Mech., Elec., Motor, Aero, Radio and "Talkie" Engineering, and explains the unique advantages of our Employment Department. "ENGINEERING OPPORTUNITIES" has shown the way to better things to over 120,000 of your fellows. Send for your copy to-day—Free and without obligation.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY,
401, Shakespeare House, 29/31, Oxford Street, London.

WIRELESS CABINETS

We can supply any type of Cabinet ready to accommodate your Radio Set direct from our works. Send 2d. in postage stamps for our illustrated catalogue and photographs of our latest models.

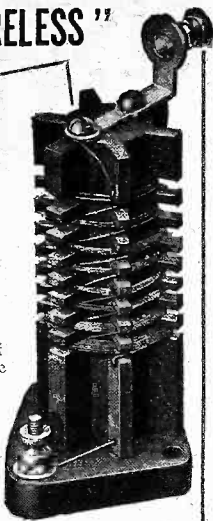
REDRUP & SON, Radio Cabinet Makers,
178, ALBERT ROAD, SOUTHSEA

"POPULAR WIRELESS"

says:

May 14th, 1932.

You instinctively realise the "GOL-TONE" SHORT-WAVE H.F. CHOKE is the work of a man or men who are excellent mechanics, have imagination and a knowledge and love of Radio. Yes, I like this little "GOL-TONE" CHOKE and recommend it to the attention of all Short-Wave "fans."



"GOL-TONE" SHORT-WAVE H.F. CHOKE

Self-capacity reduced to a minimum. 1-3 μ F. Wave ranges covered, approx: 10 to 100 metres. Can be mounted on Baseboard, Panel, or suspended in wiring; may be connected direct to valveholder.

P.W.C/26 - Price 2/6 each. From all first class Radio Stores, if any difficulty write direct. Radio Catalogue on request.

WARD & GOLDSTONE, LTD. PENDLETON, MANCHESTER

2/6 EACH

TECHNICAL NOTES

(Continued from previous page.)

arranged so that the anode currents flowing through the two valves are equal.

Of course, all this is on the assumption that the valves are *reasonably* alike as regards their anode impedances and amplification factors; if they are seriously different they should not be operated together as a push-pull amplifier at all.

Mains Sets.

Although battery voltages vary quite a lot, we are accustomed to think when we go over to mains operation that the voltages are quite constant, but this is not so, and in some cases or in some districts the mains voltage will vary to a surprising extent.

Now this will have an instant effect upon the efficiency of the valves, and therefore upon the operation of the whole of the receiver; but in addition to this, increases in the voltage applied to the valves, above the normal voltage, especially if frequent or long-continued, will have quite a serious effect upon the lives of the valves themselves.

I dare say you know that modern electric lamps of the ordinary filament type are run up to very high temperature for efficiency, but a very small increase in the voltage that is, in the temperature of the filament, will produce a relatively serious shortening of the life of the filament.

Voltage Regulation.

In the case of a wireless valve, especially now that filament temperatures have been brought so low, you might think that there was ample margin for temperature variations, and that considerable increases could be borne without endangering or shortening the life of the valves. Messrs. Ferranti, Ltd., however, tell me that voltage regulation is most important for radio purposes where mains valves are used and that mains valves will have their lives appreciably shortened by long-continued overload of even as little as *five per cent*.

When they say that their lives are shortened they do not mean, of course, that the filament will be in danger of burning out, but, as you know, a dull-emitter filament may become practically useless as an *emitter*, or at any rate very inefficient, although it is far from being actually physically destroyed.

A Ferranti Regulator.

In this connection you will probably be interested to know, although it really belongs to the realm of heavy electrical engineering, that Ferranti's make a number of special voltage regulators for keeping the voltage of the electric supply as constant as possible.

These are enormous pieces of engineering plant and do not directly concern the radio user, as naturally they are installed at the electric power generating stations. But, inasmuch as their purpose is to prevent variations of the line voltage they play a very important part in connection with the satisfactory operation of radio receivers, and more so as more people change over to mains operation.

Valve Construction.

Talking about valves, the manufacture of valves is nowadays a very much more

(Continued on next page.)

PILOT AUTHOR'S KITS

Exact to Specification

CASH—C.O.D.—H.P.—Immediate Delivery.

OUTDOOR 3

As described in this week's issue.

KIT "A"

Author's Kit less valves, cabinet and speaker unit.

CASH or C.O.D.

£4-7-9

or 12 monthly payments of 8/.

KIT-BITS

Selected C.O.D. Lines for Outdoor 3. You pay postman—

We pay all post charges on all orders over 10/-

Aluminium Box, Screen, and Baseboard	8 6
2 Formo '0005-mid. log-mid line Condensers with Ormond slow-motion Dials	10 0
Varley Pentode Output Choke	12 6
Goltone Cosmic Dual Range Coil	5 6
Set of Specified Valves	2 1 0
Specified Camco Cabinet	1 15 0
Sheet of Kraft Paper	9

COSMIC SETS

COSMIC III KIT "A"

Author's Kit less valves and cabinet.

CASH

or

C.O.D. 70/-

EASYWAY:

12 monthly payments of 6/5

COSMIC III STAR KIT "A"

Author's Kit less valves and cabinet.

CASH

or

C.O.D. 87/6

EASYWAY:

12 monthly payments of 8/-

EASIWAY ITEMS

SUPER V.3. KIT ("Radio for the Million") for A.C. mains, including valves, cabinet, speaker, and mains equipment. Cash Price £15/11/3. Send 28/6 only

Balance in 11 monthly payments of 28/6.

COSSOR ALL-ELECTRIC MELODY MAKER, TYPE 235 for A.C. mains, complete with valves and cabinet. Cash Price £29/9/6. Send 17/4 only

Balance in 11 monthly payments of 17/4.

EPOCH A2 PERMANENT MAGNET MOVING-COIL SPEAKER. Fitted with multi-ratio input transformer. Cash Price £23/3/0. Send 5/9 only

Balance in 11 monthly payments of 5/9.

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer. Cash Price £2/15/0. Send 5/- only

Balance in 11 monthly payments of 5/-.

ATLAS ELIMINATOR TYPE A.C.244. 3 Tappings, S.G., Detector and Power. Output: 120v. at 20 m/a. Cash Price £2/19/6. Send 5/6 only

Balance in 11 monthly payments of 5/6.

SEND

1/-

ONLY

PILOT ENVELOPE, SELECTIVE FAMILY 3 containing FULL SIZE BLUEPRINT, 5 PHOTOGRAMS, and List of parts with details of newly invented Simplified System of Home Construction for an AMAZING 60 STATION 3-VALVE RECEIVER.

PETO-SCOTT CO. LTD.

77, CITY ROAD, LONDON, E.C.1.

Dear Sirs, Please send me CASH/C.O.D./H.P.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

CLIX FOR PERFECT CONTACT

"Fit-all" SPADE TERMINAL 2d.

"MASTER" PLUG 1 1/2d.

PANEL TERMINAL 3d.

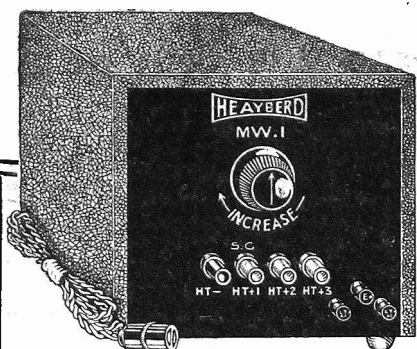
The Clix range covers over 28 different fittings, each designed to create Perfect Contact—and give better radio.

"Clix" are constantly specified by the technical press. Illustrated Folder 'P' on request.

Lectro Linx Ltd., 254 Vauxhall Bridge Rd. S.W.1

TECHNICAL NOTES

(Continued from previous page.)

**200 volts at 40-50 ma.**

Outputs of Heayberd MWV.1 Mains Unit—expressly chosen by Technical Experts for their latest receivers. Complete in neat Steel case. Bakelite Panel. Westinghouse Rectifier. Heayberd double-core Choke and 16 mfd. Block Condenser ensures perfect smoothing. Heayberd Mains Transformer gives hum-free results. Special earth terminal for L.T. supply. Complete and ready to switch-on.

OUTPUTS: H.T. 200v. @ 40-50 ma. L.T. 4v. 5 amp. Raw A.C. Supply.
TAPPINGS: H.T. 60/80v. Var. S.G., 180 and 200v. fixed.

Price 127/6

I enclose 3d. stamps for Descriptive Lists, with circuit diagrams, of Heayberd Mains Products.

HEAYBERD

MONARCH OF THE MAINS.

10, FINSBURY STREET, LONDON, E.C.2.
One minute from Moorgate Underground Station.

EASY PAYMENTS**"There's no place like HOLMES."**

The first firm to supply Wireless parts on easy payments. Seven years' advertiser in "Popular Wireless." Thousands of satisfied customers.

	Monthly	Deposit	Payments
TELSEN VICTOR 3 KIT	39/6	5/5	7 of 5/5
COSSOR KIT	£6/8/6	10/-	11 of 11/11
OSRAM KIT	£10/15	19/6	11 of 19/6
METEOR 3 KIT	£3/15	6/10	11 of 6/10
EXIDE H.T. Accum., 120v.	£3	6/-	9 of 6/8
BLUE SPOT 66R & CHASSIS	£2/2/6	5/6	9 of 4/5
BLUE SPOT 100 U	39/6	5/8	7 of 5/4
AMPLION M.C.6	67/6	7/5	9 of 7/5
CELESTION M.C.	47/6	5/3	9 of 5/3
EKKO Eliminator A.C.18	67/-	7/5	9 of 7/5

New Goods Obtained for Every Order.

Send us a list of the parts you require and the payments that will suit your convenience, and we will send you a definite quotation. Anything Wireless.

H. W. HOLMES, 29, FOLEY STREET,
Great Portland Street, London, W.1.
Phone Museum 1414.

LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Speciality, 5/-)

Transformers 4/-, Headphones 4/-, all repairs magnetised free. Eliminator Repairs quoted for. 24 Hours Service.

Discount for Trade. Clerkenwell 9069
E. MASON, 44, EAST ROAD, N.1.

EXACT TUNERS

250 to 2,000 metres. Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.

THE EXACT MANUFACTURING CO.,
Croft Works, Priory Street, Coventry.

PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks!

scientific and accurate business than it was a few years back.

In the old days, seven or eight years ago, the electrodes of the ordinary receiving valve were fairly widely spaced, and slight errors did not make any material difference to the characteristics. But in these days of valves with steep-slope curves, when clearances between electrodes are very small, accuracy is all-important in the construction of the valve, that is, if its characteristics are to bear any reasonable approximation to those set out on the makers' specification chart.

All this means a good deal of expensive machinery and refinements, not only in the manufacture, but also in the testing. Notwithstanding the fact that the modern radio set demands a much higher standard of valve efficiency than was the case a few years ago, I think it is safe to say that the demands are met-to-day even better than ever, and British valve makers undoubtedly hold the leading place in the world in this important field.

The Importance of Fuses.

Commercially-made sets almost invariably incorporate the necessary fuses in the high-tension and low-tension circuits, but in home-made sets this important precaution is, I am afraid, often overlooked or omitted as being unnecessary. To leave out fuses is simply to be penny-wise and pound-foolish, because where a fuse consisting, perhaps, of a flashlamp bulb costs but two or three pence, it may well save you as many pounds worth of valves.

You may go over the circuit as carefully as you like and decide that there is no possibility of a short circuit causing any damage to the valves, but you never know what form the accident is going to take. A breakdown in a valve, for example, may result in other valves receiving the high-tension voltage into the filament circuit. A fuse in the negative high-tension lead would prevent this.

Transformer Variations.

One circumstance which has often saved a valve in case of a breakdown is the fact that the small transformers used have poor "regulation"; that is to say, when a heavy load is thrown upon the output winding, the voltage simply falls correspondingly so that the transformer cannot stand up to any very heavy overload.

This, of course, is all to the good in the case of an accident.

Sometimes resistances are used which, whilst small compared to the rest of the resistances normally in the circuit, so that they have very little effect upon the normal intended current, are large compared to the other resistance in the event of a short-circuit. In such a case the safety resistance prevents any large flow of current in the circuit.

But even this is not really sufficient to rely upon, and it is much better to use fuses, either regular fuses made for the purpose or flashlamps at the necessary points in the circuit. So next time you build an all-mains receiver be on the safe side and fix a pair of suitable capacity fuses in series with the mains lead to your set.

"O.K. — well worth trying"
says the
Technical Expert
of **"POPULAR WIRELESS"**

"Nearly every listener I meet asks: 'What do you think of the PIX?' I answer: 'Quite O.K. Well worth trying if your set isn't sufficiently selective.' One of the widest used arrangements for improving selectivity is a series aerial condenser, and the PIX is a variable condenser of a convenient form for the purpose, at a price below that of any ordinary condenser—so that 'Quite O.K.' is quite a modest appraisal of its virtues. By pushing in and pulling out the tubular section of the PIX you can vary selectivity, while an excellent pre-detector volume control is also afforded."—*Popular Wireless*, April 30th (unsolicited).

DO AS THE EXPERTS RECOMMEND—
FIX A PIX



PIX increases the range and selectivity of ANY Set, whether crystal, battery or all-mains. Better than a preset aerial condenser because it has a lower minimum capacity—'000004 (certified by Faraday House). It also has greater range (40-1 maximum to minimum) and is out of action when closed. Cut out interference by fixing a PIX in YOUR aerial: From your dealer or send P.O. direct to:—

THE BRITISH PIX CO. LTD.

(Dept. 191),

14 Newgate Street, London, E.C. 1

Phone: CITY 1044.

CORDO**GANGED SWITCH**

AS SPECIFIED FOR THE NEW "P.W." PORTABLE.

2/6

Telephone: Victoria 6873.

POST **CORDO ELECTRICAL PRODUCTS, LTD.,**
FREE 68, Victoria Street, London, S.W.1.

REMEMBER! "POPULAR WIRELESS" has the largest sale of any WEEKLY WIRELESS JOURNAL.

OUTDOOR THREE

Solid Oak Cabinets, 15½" x 15½" x 8" overall, beautifully polished and finished with frosted ply front, 17/6 post free. Send all your Radio requirements to us and save 10% to 20%.
Griffener Radio, Netherwood House, High Road, East Finchley, London.

A Good Set or Mains Unit — needs a Good Earth

GODWIN EX
NON-CORRODING EARTH TUBE

gives consistent round. Heavy lead out prevents gives perfect connection soldering. sq. ins. sur-

earthing all the year coating inside and corrosion and earth wire without Over 180 earthing face.

3/6

J. DYSON & CO. LTD., 567 GODWIN ST. BRADFORD
2, COLEMAN ST. LONDON E.C.2

Make
The DAILY SKETCH
YOUR Picture Paper

BRITAIN'S BEST RADIO SIXPENNYWORTH!

The WIRELESS CONSTRUCTOR

JUNE NUMBER

Price Sixpence

NOW ON SALE

This new issue contains a special selection of vitally interesting articles from the pen of

JOHN SCOTT-TAGGART, F.Inst.P.

INCLUDING A FULL DESCRIPTION OF

**CONVERTING
YOUR SET**

INTO AN

S.T. 300

BY MEANS OF THE

S.T. 300

Adaptor

It transforms any set into this astonishingly successful circuit

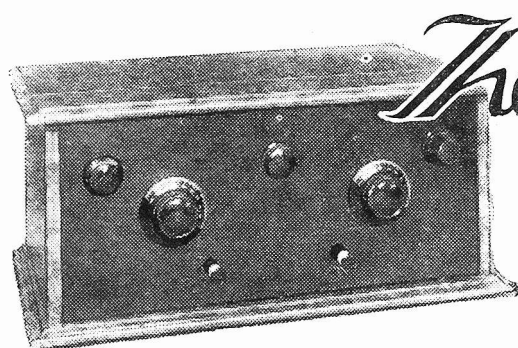
**POWER AND
SELECTIVITY
ENSURED!**

**MAKE CERTAIN OF
YOUR COPY!**

**SURE TO BE A
HUGE DEMAND!**

Many other fine features for listener and set builder are included in the June issue of "The Wireless Constructor," and in response to innumerable requests from all over the country it also contains a concise description of

HOW TO MAKE



The **S.T. 300**

THE SET THAT EVERYBODY'S TALKING ABOUT!

In the
JUNE

WIRELESS CONSTRUCTOR

On Sale Everywhere
SIXPENCE.

PARAFEED dominates modern receiver design



Modern receiver designers have now adopted the R.I. method of L.F. amplification, introduced by the Parafeed. It has no equal where uniform and high amplification is required over the wide range of frequency demanded in modern reception. The N.P.L. curve is a weighty argument.

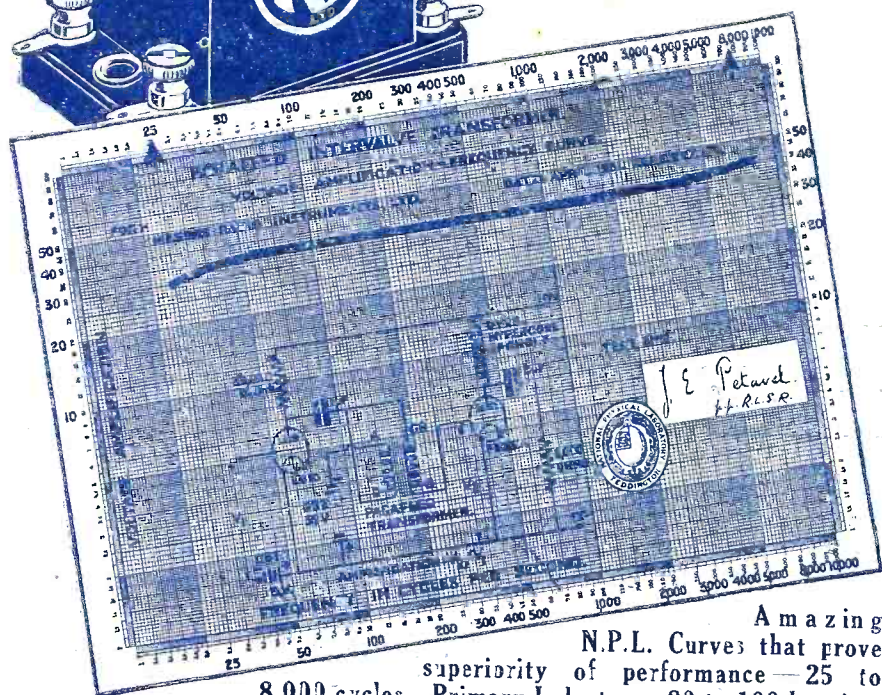
The PARAFEED L.F. TRANSFORMER

The "Parafeed" presents advantages not obtainable with any other types. For instance, it may be used with any type of preceding L.F. valve. Time has proved that, despite its seemingly absurd smallness and little weight, it is the best transformer on the market for modern L.F. conditions.

Get a copy of the Parafeed Book from your dealer or from us. It is an education in amplification.

Primary Inductance 80-100 henries.
Primary D.C. Resistance 1,100 ohms.
Secondary D.C. Resistance 2,800 ohms.
Turns Ratio 1:3 (or 1:6 for the S.T. 300). Ratio of 1:4 obtainable by cut-to-connection. List No. D.Y. 28.

8/6



Amazing N.P.L. Curves that prove superiority of performance—25 to 8,000 cycles. Primary Inductance 80 to 100 henries.

The DUX AUDIRAD Combined H.F. and L.F. Choke

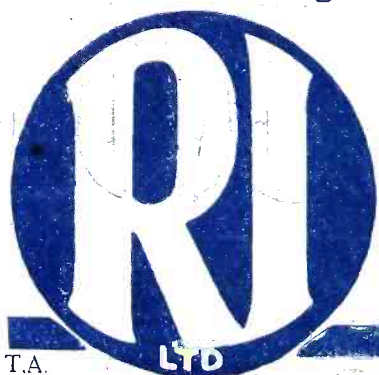
Another great superiority in component design

Two components in one is the Audirad—it deals with L.F. and stops the unwanted H.F. frequencies. It is now universally acknowledged as the most efficient and economical choke on the market—economical in price and economical in the space it occupies.

Ask for the "Dux Audirad" leaflet, which contains full technical information and diagrams.

L.F. Inductance 25 henries. H.F. Inductance of H.F. Stopper 10,000 microhenries. Maximum D.C. Current 50 m.a. Overall Dimensions: 2 ins. x 2½ ins. x 2½ ins. Weight 15 ozs. List No. D.Y. 31.

8/9



T.A. Advt. of Radio Instruments Ltd., Croydon, Surrey. Phone: Thornton Heath 3211.

Printed and published every Thursday by the Proprietors, The Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: Messrs. John H. Lile, Ltd., Ludgate Circus, London, E.C.4 (Telephone: City 7261). Registered as a newspaper for transmission by Canadian Magazine Post. Subscription Rates: Inland and Canada, 17/4 per annum; 8/8 for six months. Abroad (except Canada), 19/6 per annum; 9/9 for six months. Sole Agents for Australia and New Zealand: Messrs. Gordon & Gotch, Ltd.; and for South Africa: Central News Agency, Ltd. Saturday, May 21st, 1932. S.S.