

FEATURED THIS WEEK **WIRELESS IN THE WAR ZONE**

Popular Wireless

Every Thursday
PRICE
3d.

No. 513. Vol. XXI.

INCORPORATING "WIRELESS"

April 2nd, 1932.

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FOR GREATER
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AND POWER**

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HOW DOES THE QUALITY OF REPRODUCTION COMPARE WITH OTHER SETS?

Wireless Magazine says: "This is one of the best sets we have tried this season. Loudspeaker output is extremely well-balanced, top and bass notes coming out with a delightfully natural timbre."

Amateur Wireless: "The quality of reproduction from the self-contained loudspeaker is simply great. The deep bass and the clear-cut treble combine to give a balance of tone not often found in table sets."

And *Wireless World* reports: "The quality of reproduction is well up to the standard expected from an 'His Master's Voice' product, with the output nicely balanced and the bass well in evidence without being overpowering, or obscuring the upper register, the reproduction of which is good."

IS THE 435 SENSITIVE?

Wireless Magazine says: "Sensitivity is equally good at the top and bottom ends of the tuning scale, Cologne and Budapest were taken as the two extremities, and both came out well."

And *Wireless World*: "Sensitivity is well above the average for a receiver of this type."

IS IT SELECTIVE?

Wireless World: "When searching for distant stations, the characteristic sharp cut-off of band-pass tuning was quite evident by the way signals quickly attained maximum intensity and the rapid decline to inaudibility beyond the normal setting. The long waveband provided eight alternative programmes, all at good volume. Königswusterhausen, between Daventry 5XX and Radio Paris, was not affected by the proximity of these stations, although the last mentioned was exceptionally strong."

And *Amateur Wireless* says: "Selectivity will satisfy most listeners even if they live quite close to the regional centre."

While the *Gramophone* says: "The sensitivity and selectivity are all that can be expected of a set of this calibre; in this respect, indeed, we should rate it well above the average."

IS IT SIMPLE TO OPERATE?

"Control is altogether delightful," says *Amateur Wireless*. "If you are a set buyer who likes simple operation, here is a set that is outstandingly attractive."

Wireless World adds, "Practically every modern feature likely to enhance the performance of the set and simplify its operation has been incorporated."

OTHER OUTSTANDING FEATURES

"Its many technical points," says *Wireless Magazine*, will interest the enthusiast, and its wonderful performance will thrill the ordinary listener. Model 435 incorporates many requirements not found in the usual straight set."

While *Amateur Wireless* says: "It would be difficult to overdo praise for this excellent table console set, which has a great many points that distinguish it from the ordinary run of sets... I am very much impressed with the meticulous care taken at every point to assure good results," and sums up by describing the instrument as "one of the most outstanding triumphs of the British Radio Industry."

SPECIFICATION 3-valve radio receiver and moving coil loudspeaker in walnut cabinet. Mains operated (A.C. or D.C.). Band-pass tuning. Marconi valves. One tuning knob. One volume control—new "His Master's Voice" frictionless pattern. One operating switch—new continuous action pattern. Unique illuminated control scales, showing only what is operation—long waves, short waves or the playing of gramophone records from a pick-up. Mains aerial (A.C.) Plugs for additional loudspeaker.



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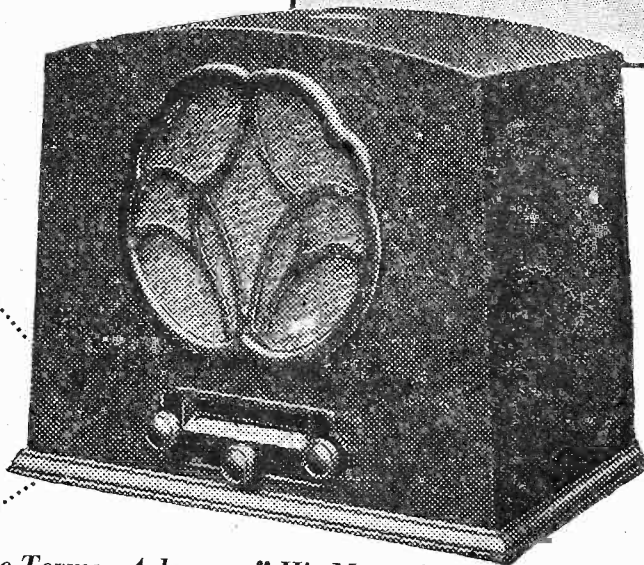
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The Gramophone Co., 365a Oxford Street, London, W.1.
Please send me full particulars of "His Master's Voice"
Radio Set Model 435, and address of my nearest dealer.

Name

Address

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Obtainable on Hire Purchase Terms. Ask your "His Master's Voice" dealer for demonstration and full particulars.

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Popular Wireless

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Editor: NORMAN EDWARDS.

Technical Editor: G. V. DOWDING, Associate I.E.E.

Assistant Technical Editors:

K. D. ROGERS, P. R. BIRD,
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SWEET LUCK
JOAN AND BETTY
HENRY HALL
"OPEN ALL NIGHT"

RADIO NOTES & NEWS

A BACCY BOOST
RAIN AND RADIO
ABOLISH AERIALS?
THE WHOLE TRUTH

Luck o' the Sweep.

I KNOW a man who seems to be going to fill a fat wallet, all along of that Grand National Sweep. "What are you thinking of doing with all that dough, Sam?" I ses. "Blue a couple of hundred and find a nice, safe, four per cent for the rest," ses he.

"Anything special in mind for the blueing?" I asked. "Sure," he replied, "the dream of my life—a real radio outfit—galore and regardless. Sets for short, medium and long, and ultra short, all on a switch." "But a Cosmic 'll do that—barring the ultra short," I said.

Bang went his dream, and now I expect he'll go and buy a radio-grammy as big as a sideboard—and hate it.

"Joan and Betty."

IF you have kiddies of your own, and if they enjoy the Bible stories which are broadcast on Sundays, you may like to know that a new series of those stories has begun and will run till the end of July. An illustrated synopsis of each broadcast, entitled "The Greatest Adventure," has been published (editor, Mr. E. R. Appleton, the West Regional Director) at sixpence, by James Nisbet & Co. I have a copy of this booklet, and think that Sunday School teachers would derive much help from it. Something of Arthur Mee's genius about it!

Radio and the Royal Society.

CONGRATULATIONS to Mr. T. L. Eckersley, brother of Capt. P. P. E., on his success in having a paper accepted for publication by the Royal Society. The paper, entitled "Examples of Phase Integral Methods Applied to Electromagnetic Wave Transmission," is a sequel to one already published by the Royal Society, "Connection Between the Wave Theory of Electric Waves and Dynamics." This is a feather in Mr. Eckersley's cap, and an honour to the Marconi Research Laboratories, by reflection.

"Fear, and Be Slain."

YEARS ago I suggested in these columns that "action" talks by soldiers, sailors, hunters, explorers, etc., would be exceedingly popular. The "Escape"

series proved the truth of my remark and I am delighted to learn that another series, entitled "Hazard," is to begin in May.

Such talks cannot but exert a tonic influence upon a community which is being brought up on the baby's food, "Safety First." A better slogan for us all would be

magazine with an additional dose of pep, punch and personality. Mr. Scott-Taggart, if I am not mistaken in my judgment, is in these days evincing a strain of wit which, if he possessed it before, he certainly held in abeyance in the old days.

His style is mellow, his reflections rounder, his approach to the reader more sympathetic. He has added much to the engineer who designed the "S.T. 100," and that is pure gain to all his readers.

Give Henry Hall a Chance.

THE day after Henry Hall's crowd made their debut I noticed some fairly sharp press criticism of their performance so sharp, in one instance—that of an evening paper—that I received the impression that the critic, who was unpleasantly dogmatic, had made up his mind to slate anyway.

I should think that it would be sporting to let the lads have a week or so in which to shake down before subjecting them to ears too critical to hear much that is good. I myself was favourably impressed, but I am going to lie low for a bit till the band has shown its pace.

A Queer Conference.

WHAT I think must be one of the queerest conferences ever held took place last month at Verona, when two hundred rhabdomancers met to try to discover a scientific interpretation of the phenomena of "divining" or "dowsing" as it is also termed.

They were unable to "divine" an interpretation, though there were several references to electromagnetic energy, one delegate expressing the view that the human body is a radio receiving and transmitting station. Eventually they decided to form a rhabdomancer's union—to prevent the trade from "sweating" I presume.

"The Wireless Constructor."

THE April number of this wonderful sixpennorth of radio contains, *inter alia*, the first article of a new feature called "From My Armchair," written by Mr. Scott-Taggart. It has endowed the

The Late "Wish Wynne."

THERE is a movement afoot to endow a bed at "Barts." in memory of the charming lady who almost up to the time of her death used to broadcast under
(Continued on next page.)



Radio played an important part in relaying the recent ceremony in Rome on the tenth anniversary of the coronation of the Pope. This picture shows a small section of one of the enormous crowds in the Holy City.

Seneca's saying, "Courage leads to Heaven; fear, to death."

NEWS—VIEWS—AND INTERVIEWS (Continued)

the name of "Wish Wynne." Her "turn" was one of the most popular in the B.B.C.'s variety programmes, and all who appreciated her marvellous impersonations of the slum Cockney girl-child might well consider whether they could send a small sum to the B.B.C., to help to endow a resting-place for a real child of London fallen by the wayside.

"Open All Night."

SOME of our technical staff have been telling me that so keen are our readers that it is no uncommon occurrence for them (the techs.) to be "rung up" at their residences during the evening in order that they may impart information to seekers after wireless wisdom.



Of course, these technical chaps are awfully kind-hearted, and always willing to help, and they merely mentioned the matter in a good-natured, casual sort of way. They never want or need sleep, food, or relaxation of any kind, and invariably sit by their telephones at home waiting for calls. Nevertheless, if you will forgive your Uncle Ariel for barging in—there is a very efficient "Queries" Department at your service.

Did You Hear Lizzie?

I AM indebted to N. M. S. (Elisabethville) for notes regarding tests made by the Government station, O Q H. They took place in January, on wave-lengths of 46.18 metres, 33.61 metres, and 15.44 metres, the broadcast matter being French "talks" and records.

This information may help to complete some of your logs. By the way, N. M. S. has tried out W. L. S.'s method of using an earthing plate underneath the baseboard and finds that hand-capacity effects are thereby abolished. All the earth leads go as shortly as possible through holes in the baseboard. Read, mark, learn, etc.

An Idea for the B.B.C.—Give Baccy a Boost!

WHAT about a Tobacco Fantasia or a Baccy Boost? Or is it wicked to smoke?

Scena: Raleigh in Virginia, discovers Smoking. Raleigh brings home the Weed and his pipe is put out by his servant. Readings from King James' "Counterblast to Tobacco," Calverley's immortal poem about tobacco, and "My Lady Nicotine." Short talk by a medical authority



on the blessings of Baccy; another by a tobaccoist, all about honeydew, bird's-eye, perique, twist, navy cut, latakia, snuff, old smoking implements and customs. I

think that a very instructive and amusing "show" of about an hour and a quarter could be run on some such lines.

Rain and Radio.

I FIRMLY believe that the notion that radio causes rainfall has grown up from ideas spread abroad by conservative or simple-minded people who attribute dire national events to the agency of the latest innovation. In the early days of broadcasting I had many letters from people who thought that fires, bad crops, and epidemics of disease were caused by radio. I do not believe that radio causes abnormal rainfall—because there is no abnormal rainfall! The normal rainfall can only be established by averaging over

Where to see "P.W." Sets

LOCAL DEMONSTRATIONS BY DEALERS.

Last week we were able to announce that we are arranging for the famous "Cosmic" and other "P.W." receivers to be demonstrated at leading radio retail shops throughout the country.

There have been enthusiastic inquiries from all parts of the British Isles, and applications from retailers are still pouring in, so that "P.W." readers in the majority of the towns in this country will soon be in a position to examine actual "P.W." sets, and to have them demonstrated locally.

In an early issue we shall begin publication of a series of lists of names and addresses of those retailers who have agreed to co-operate in this scheme—a scheme which will not only enhance the popularity of the "Cosmic" but which will in many ways greatly assist "P.W." readers generally.

Any retailer desiring to exhibit a "Popular Wireless" "Cosmic" set—whether purchased through a wholesaler, or built up from the specification published in "Popular Wireless"—may apply to the Editor to be placed on our official list.

In a very early issue we shall publish an article giving further details of the scheme.

a period of years, and meteorological authorities will, I think, bear out my belief that it is no rainier now than in Nelson's day.

Should Aerials Be Abolished?

I HAVE had a letter from C. A. McK. (Edgware), which, though it shows evidence of constructive thought, clearly does not connote sufficient thought.

My correspondent tries to prove that all the aerials in this country exert an attractive force upon rain clouds and pull them landward. Does he not overlook the fact that even if we were to abolish every blessed aerial, each telegraph and telephone wire, every steel structure—in short, every conductor, would act in the same manner? Every corrugated iron cowshed and barn is an "aerial"!

One other point! Let my scientific friend

consider how weak is the "field" created by all the aerials in Britain and Europe, at any point at a distance of, say, 500 miles from the centre of England in any direction. I should worry!

Did Patriotism Pay?

A CERTAIN Scottish motor-driver recently was smitten by a brainwave. Calling at the house of another Scots body, he explained that he was authorised to inspect radio licences and collect unpaid fees therefor.

The set was not licensed; so he collected ten shillings and evaporated. Then the puir Scots body found that our hero was a fraud.



However, he kept his eyes open, and was lucky enough to see his man watching the arrival of Prince George at the Carron Ironworks, from which encounter the financier has not yet recovered, for it led to Falkirk Sheriff Court and a fine or twenty days. Another recruit to "Home Rule for Scotland!"

The Whole Truth.

AS R. W. (Greenock) exhibits curiosity about "Ariel's" past, I may as well own up now and answer him and a lot of other inquirers as well, though I'll have to act as my own censor in certain places. I do not know why R. W. imagines that I have been a wireless operator, or why last year someone thought I was borrowed from one of the motoring periodicals. However, I may say that I have been pretty nearly everything in radio except an announcer or comedian. My first radio job was to scrub the floor of a radio station, the next being window-cleaning; so I have been in the game from the ground-floor up, as they say.

Our Suggestion Adopted.

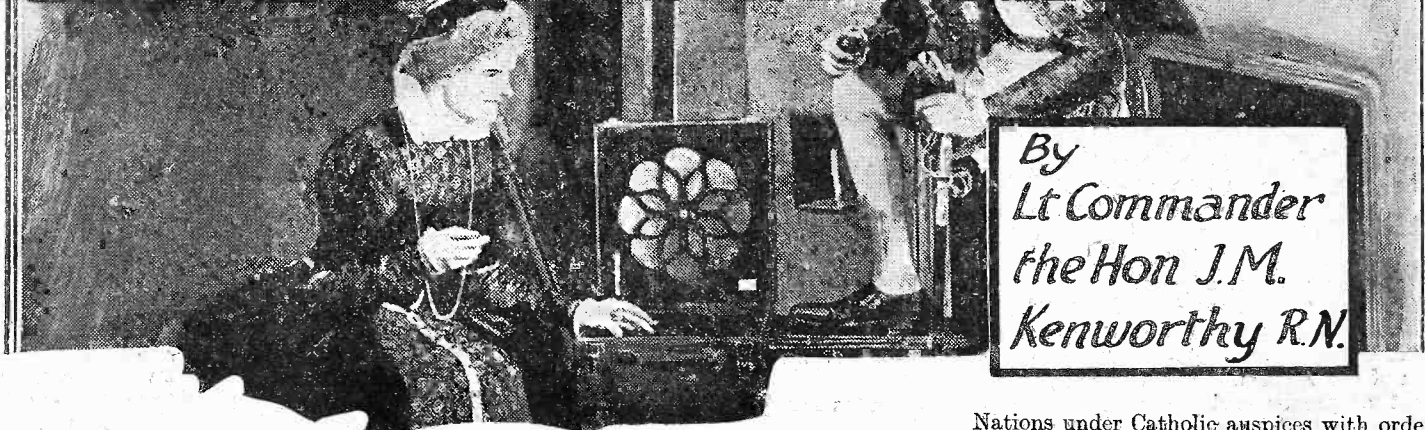
IT is gratifying to find one's suggestions usefully adopted sometimes. I remember that not long ago the Criminal Underworld, Class 5, Section Radio, Sub-Section Portable, was organised, and McMichaels', notably, began to lose their excellent sets, I pointed out that window-displayed portables would have to be screwed down.



Mr. W. Brown, of Kentish Town, has evidently been revolving the matter in his mind, for when the pilot brick went through his plate glass recently, and the Little Friends of Radio tried to pluck a nice juicy Marconiphone set, they found that it was secured by a steel chain. Having no plain van handy, they could not take shop and all, and so they passed on to some less suspicious trader's premises.

ARIEL.

HOW WIRELESS WOULD HAVE ALTERED HISTORY



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

WIRELESS is affecting business, social life, and politics profoundly. It is no exaggeration to say that if this wonderful invention had come earlier the history of the world would have been different.

Certainly, the history of this country would have been altered; sometimes for the better, sometimes for the worse. In this and the following articles I consider some of the great and decisive events in our troubled island history, and how they would have developed and how the destiny of this country might have been, and in some cases certainly would have been altered if there had been the better and quicker means of communication that wireless telegraphy provides.

At the end I will describe how wireless did affect this country and the history of the world during the terrible years between 1914 and 1918. And I shall then disclose certain facts that are only known to a few people, but which I consider it right should now be revealed to the general public.

In Armada Days.

Let me begin with one of the great turning-points in our history, the attempted invasion of England by King Philip of Spain, and the defeat of the Spanish Armada. All the then known world watched this great trial of strength between Catholic Spain and Protestant England.

It was not merely a war between two peoples. King Philip was a resolute and able monarch, one of the greatest leaders that mediæval Catholicism had produced. And he represented an ideal—Imperialism. Looking back over the lapse of years we can appraise the politics of Philip and his allies and colleagues with a better understanding.

He stood for authority, for the super-State, for the ideal of a Europe united in the Holy Catholic faith and the re-establish-

Supposing Drake's ships had been fitted with radio? What if Napoleon's forces had been equipped with wireless? These are fascinating speculations, made the more so when dealt with in Commander Kenworthy's authentic and entirely readable style. Later in the series—for this article is the first of several—he will make public for the first time certain facts concerning the Great War and how radio really did alter history.

ment of a system that would take the place of the Roman Empire, welded together both on a spiritual and material basis.

COMMANDER KENWORTHY AT HOME



An intimate picture of our distinguished contributor.

Spain was immensely wealthy owing to the exploitation of the New World. Philip had able generals and admirals, and his Spaniards a high reputation as fighters and navigators. The intention was to establish what would now be called a League of

Nations under Catholic auspices with order imposed from above and wars prevented.

But this arrangement would also have hindered the free development of the rising nations, of which only little people of England were in the vanguard.

Protestantism was as much a revolt against Imperialism as a religious doctrine. It was the progressive movement of its time. At all costs England and its revolting religion must be suppressed. Philip's determination was stimulated by three factors.

He was a religious fanatic, he wished to avenge the death of Mary Queen of Scots, and he meant to teach a lesson to these upstart privateers, for, put into present-day language, His Most Catholic Majesty looked upon the English as Bolsheviks and pirates. Only utter defeat turned him from his purpose.

The plan was well thought out. One of the best soldiers of his day, the Duke of Parma, was to assemble 30,000 troops, Spanish veterans (some of the best fighters in Europe), in the Netherlands; and the Armada with another 30,000 men was to sail to the Straits of Dover to cover their passage. If these two forces could unite, their combined power was irresistible.

Parma Violence.

This gigantic plan of campaign failed through faulty means of communication. If there had been a wireless system in use, the Admiral in command of the Armada would have been in communication with Parma, and they would have struck when the conditions were suitable for the combined expedition.

Whereas, the absence of wireless forced Parma to push on so as to arrive at the rendezvous at the appointed time. Secondly, the Armada could have received warnings of the approaching storms, and thus avoided the final disaster of the loss of so many ships in the gales which was the real cause of its defeat.

Thirdly, when the great Fleet was
(Continued on next page.)

HOW WIRELESS WOULD HAVE ALTERED HISTORY

(Continued from previous page.)

scattered to the eastward, after passing through the Channel it could have been reassembled by wireless signals and returned to the attack.

The lighter English forces were only able to harass the Armada in its passage "up-Channel." Considering the size of their force, the Spanish losses were comparatively trifling. The great feat of moving this huge convoy of ships, with their artillery, soldiers and sailors to make the junction with the Army in the Netherlands was actually accomplished. But then the scheme broke down as I have described.

But if lack of suitable communications upset Philip's plans, it nearly led to the ruin of the English. Queen Elizabeth was short of money and her exchequer was embarrassed. The maintenance of a large fleet in those days was a great strain on the

As a precaution, the naval ships and some of the armed merchant ships were kept at Plymouth; and they were literally surprised by the Armada, which, by superhuman efforts, had been repaired and sailed again this time with better fortune as regards weather.

Every schoolboy knows the story of Drake playing bowls on Plymouth Hoe, when the unexpected news came that the Armada was in sight. If they had managed to slip through in the night, which might easily have been the case, they would have placed themselves between the forces of Drake and Hawkins at Plymouth and the remainder of the British naval forces in the Thames and other ports to the eastward. Indeed, with a little luck, Philip's project might have succeeded, England have been conquered, and the whole history of the world altered.

The Hour of Doom.

The Spaniards were first sighted on July 19th. In those nine days the Armada, despite the fighting, reached the Straits of Dover, and anchored in Calais Roads. It seems as though England's hour of doom had struck.

The English ships which had harassed

and their captains had to make the best of their way home.

It was the greatest sea expedition ever attempted up to that period of history. It failed through the lack of an efficient means of signalling over long distances. It is probable that if wireless had been invented England would have been conquered and history profoundly altered.

AN INTERESTING FAULT

By FRANK BRIGGS.

A FEW days ago I was testing out a new receiver, and was baffled by a most extraordinary phenomenon. The loudspeaker, which was of the moving-coil type, worked beautifully at moderate strength, but as soon as the volume control was turned round towards the "full-out" position it started to emit a dreadful droning noise.

The most extraordinary thing about it was that if the set was switched through to a loudspeaker in another room, everything was normal and the volume could be pushed up until it nearly "brought the house down" without the set breaking into a howl.

What Was the Cause?

In the course of my experiments I happened to knock my hand against the ebonite panel. That did it—the loudspeaker immediately let out the most frightful "pong . . . g" I have ever heard, and off it went into a really healthy "drone."

Of course, the game was up right away, for I at once suspected that the detector valve was a particularly microphonic specimen. Well, I was not quite right, but eventually I traced it to a "dud" anti-microphonic valve holder, which was certainly not anti-microphonic, and probably never had been!

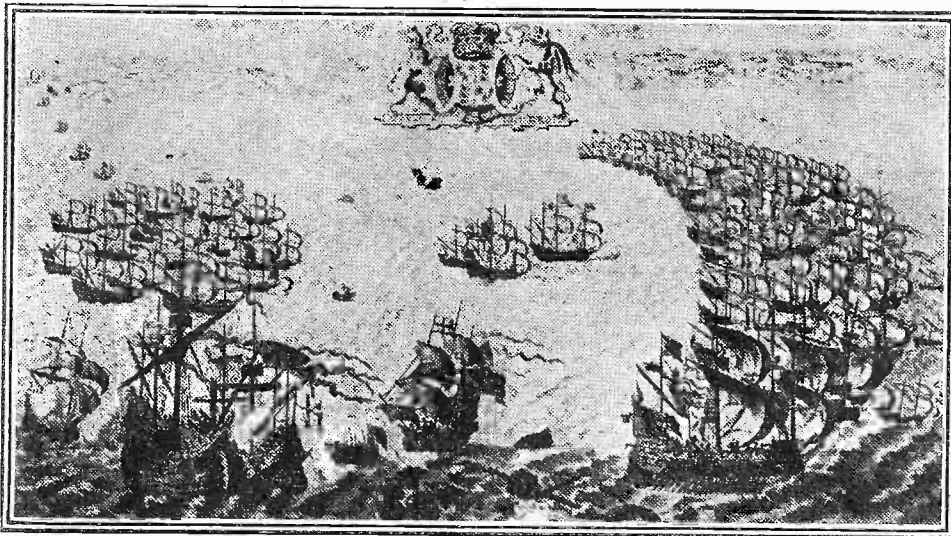
However, to cut a long story short, the valve holder was replaced by one of more reputable make, and everything was all right. Bang the panel as much as I liked, there were no more "pongs." You see, what was really happening was that after a certain volume of sound came from the loudspeaker, which was fairly close to the set, the panel, acting as a sound-board, picked up the air waves. The vibrations were then transmitted to the detector valve via the baseboard and rigid valve holder.

A Vicious Circle.

The detector valve then passed them on to the L.F. part of the set, where they were amplified before being reproduced by the loudspeaker, and a "vicious circle" was started.

When a good anti-microphonic valve holder was substituted, however, the "vicious circle" was broken, and the set behaved in a perfectly normal manner. So take warning, fellow constructors, and always use properly sprung valve holders for your detector valves. I must point out that even these do not provide infallible protection against ringing, for the vibrations from the speaker can get through the air as well as through wood!

A SMASHING DEFEAT FOR THE SPANISH



An old print showing Drake's "Revenge" smashing the giant "Nuestra Senora de Rosario" into submission.

resources of England, which had not the wealth of the Spanish Imperialists.

On May 20th, 1588, the Armada, which consisted of 130 ships, of which 65 were greater and more powerful than anything at the disposal of Elizabeth, sailed from the Tagus on their northward passage. They had no weather reports and were delayed by strong contrary winds which did much damage to the huge Fleet.

A Call at Corunna.

It only reached Corunna, in the north of Spain, after three weeks of battling with the elements. The ships were so damaged and the seamen and soldiers so discouraged that the report reached England that the expedition had been abandoned.

When the news came that the Armada had put into Corunna, the greater part of the hurriedly assembled English fleet was dispersed; for it was believed that the attempt to invade England had been abandoned for that year. The hired merchant ships, for example, were expensive.

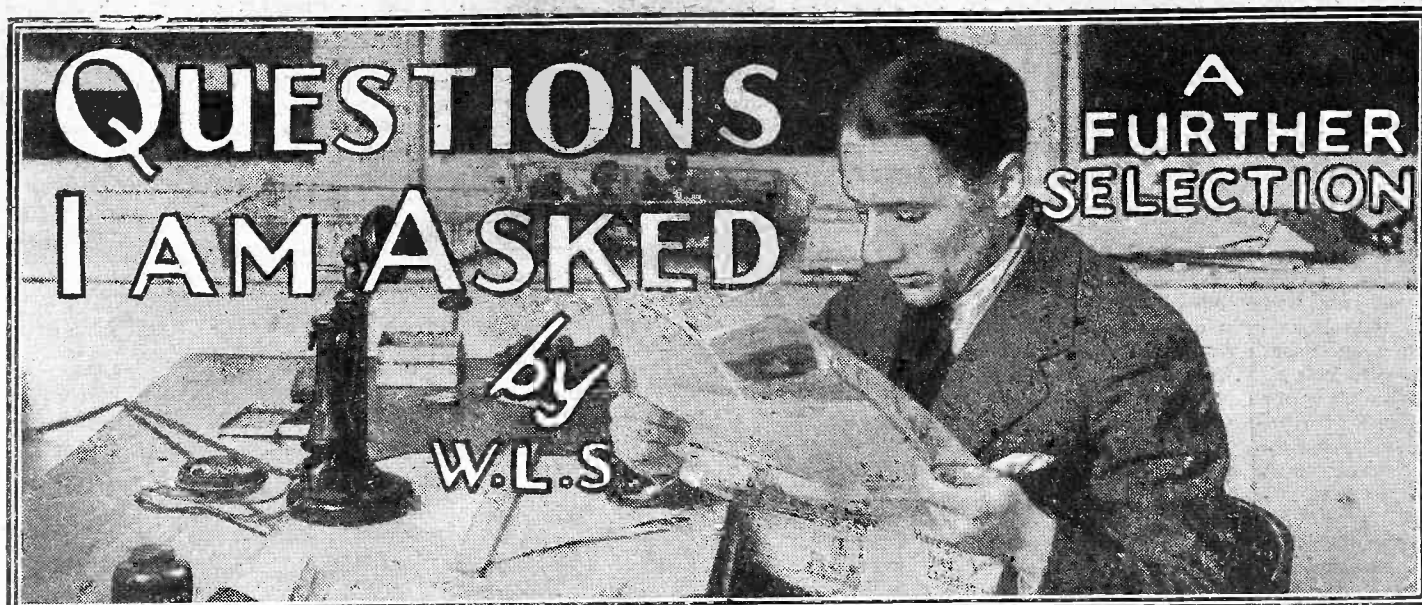
the Armada from Plymouth, had fired away most of their ammunition and been forced to return to Dover.

Lord Howard of Effingham, the Lord High Admiral of England, now in command of all our naval forces, played one last card by sending fire ships amongst the crowded Spaniards, who put to sea in a panic, three of their vessels running ashore in the confusion.

Then the gale sprang up of which, again owing to the lack of wireless, the Spaniards had no previous warning. Without better means of communication it was impossible to rally their scattered ships.

Out of Touch.

But the point is that they were through the Channel and if they could have been reassembled the junction with Parma would have been made. They were still far stronger than the English, who had suffered damage themselves, and the whole plan could still have been carried through. But there was no means of signalling from the Spanish flagship to the gale-scattered ships,



Some further information regarding short-wave receivers and reception by "P.W.'s" famous short-wave expert. By the way, it is not often that a man is able to create two individual reputations to the extent the author of this article has. As W. L. S. of POPULAR WIRELESS he is known the wide world over, and in his high official capacities in various international radio societies and organizations he commands the respect of short-wave "fans" in all countries, while his short-wave transmitter figures in the majority of the more important tests.

RECENT correspondence of mine has yielded one or two questions by readers that are of too great a general interest to be dealt with only in the post, and for the benefit of others that they may concern, I am dealing briefly with some of them in this page of "P.W."

From South Africa.

The first is specially interesting. It comes from South Africa, and reads, briefly: "Why is it that there are some short-wave broadcasts that can nearly always be counted on, while others fade right out for long periods of the year?"

There are several answers to this. In the first place, the wavelength has a pronounced effect. All waves below 25 metres seem to be subject to long "blank periods," probably because the erratic behaviour of the supposed Heaviside Layer has a greater effect upon them. Broadcast stations working in either 32-metre or 49-metre groups certainly vary in strength, but rarely disappear completely.

The most probable theory is that as the height of the Heaviside Layer varies—which it is strongly believed to do, as the sun-spot cycle progresses—it alters the angle of reflection of all short-wave signals. This angle of reflection, in its turn, varies with the wavelength, and it so happens that the 20-metre signals may be reflected in such a way that they do not return to earth in the thickly populated areas at all.

No One to Receive Them.

Thus for the "dead" parts of the year W 2 X A D and the other 20-metre group, are coming down beautifully in Siberia or the middle of the Pacific, but not in Europe or Africa.

In the case of the stations using longer wavelengths, the change in the angle of reflection is not so marked, and even if the "best spot" for reception moves by a matter of 1,000 miles or so, we still hear them fairly well.

This is enough experimental evidence to afford a fairly complete proof of the matter.

Here is another and quite different point.

The high-powered stations, when reception conditions are good, may not seem much stronger than the smaller fry. But when conditions change, and even when they are really bad, the high-powered men still come in, but the others are absorbed or disappear in some way before they reach the receiver at all.

This accounts for the consistent performance of some of the American stations round about 48 metres, which seem almost unchanged from week to week, while others close to them disappear abruptly for two or three nights and then return.

Next, and of a rather more frivolous nature, is this query: "What are the peculiar looking 'tickets' that amateur transmitters plaster all over the walls of their dens?"

About Those QSL Cards.

Candidly, I am surprised at anyone who shows ignorance on this subject of "QSL cards." The cards are simply confirmation of reception of another man's signals, and are attractively got up with the transmitter's call-sign in prominent letters, and with all the details of the gear used.

Used between amateur transmitters, they form tangible evidence of long-distance contacts that might otherwise be disbelieved. Used from a transmitter to a receiving station, they are more of a sign that a report on transmission has been appreciated.

The craze originated about 1923 (or perhaps before that), and has "caught on" so universally that there is scarcely an amateur transmitter in the world that does not use a card of some sort to send to stations reporting his signals.

On the walls of my own den are cards from about 90 different countries, as far apart as Barbados, Johore, Siberia, Sumatra, Philippine Islands, and so on.

An interesting technical query—and one to which it is impossible to give a direct answer—is: "What kind of aerial coupling is to be recommended for a short-wave set?"

Generally speaking, I am in favour of loose inductive coupling, by means of an un-

tuned aerial coil. My reasons for this preference are that it makes for a small amount of extra selectivity and tends to cut out extraneous "non-radio" noises such as sparking from trolley-buses.

It is not everyone that can use it, though, since in a poor locality one wants all the signal-strength available, and sometimes has to use tight coupling to get it. In such cases the aerial can be taken to the top of the grid coil through a small condenser.

That Series Condenser.

This can be either a neutralising condenser set to the value that gives the best results, or a small adjustable compression-type condenser. For the sake of convenience it should be so set that it does not have to be altered when new coils are plugged in for covering a different wavelength band.

The chief disadvantage of the system is, thus overcome, for one can now calibrate the receiver with some certainty. If any moving of the series condenser is indulged in, it is difficult to know where one has landed until a known station is found on the main tuning control.

Probably the best "aerial coupling" of all is a screened-grid H.F. stage, but it is not everyone that wants to use an extra valve for the purpose of coupling the aerial!

Freedom from "Dead-Spots."

Some amplification is obtained, but not a great deal; the chief advantage is the freedom from "dead spots" in the tuning, and the absence of "swing" on signals even when the aerial is blowing up against a metal gutter or a tree.

Lastly, there is a query that must have occurred to dozens of readers at some time: "How can I stop signals from disappearing when I catch hold of the head-phone cords?"

Luckily, the answer to this is straightforward. First, use a 100,000-ohm "grid-stopper" in the grid leak of the first L.F. valve. Next, try a .0005 condenser from the plate of the last valve to earth. If both of these fail, use a small H.F. choke in series with each 'phone lead.

DID YOU HEAR LISBON?

An account of "P.W.'s" historic short-wave broadcast, and details of how the programme came over.

By G. T. KELSEY.

DID you hear the special "P.W." programme from Lisbon? Was there anybody who tuned in who did not?

It may have been coincidence, it may have been sheer luck. But, however you choose to look at it, of one thing there can be absolutely no doubt, and that is that rarely, if ever before, have conditions been better for the reception of CT1AA than they were on the evening of our special broadcast on March 18th.

It is true that we were optimistic. As a matter of fact, we are *always* optimistic over shows like this. But now that the show is over, we are quite prepared to admit that not even our most ambitious hopes had led us to envisage the possibility of two full hours of loudspeaker reception without one re-adjustment of controls!

And yet that was exactly what happened at our main London listening post on the night of nights! Not that our results were by way of being exceptional or freakish, for reports, not only from our various other listening posts, but from readers all over the country, indicate an exactly similar state of affairs.

For instance, Mr. Rogers, who superintended our arrangements on the East Coast, reported full loudspeaker reception of the whole programme, with very little fading and no interference, and added that the apparatus was not touched after the preliminary adjustments!

Some Typical Reports.

From Mr. Bird, who nestled down with a short-waver, 'somewhere in Surrey,' comes a similar report. While from Mr. Briggs, who was located in Hertfordshire, and Mr. Wheatley, who listened in a spot about seven miles north of London, come reports indicating that they heard every item without the slightest difficulty.

As an indication of what happened in the South of London, an extract from Mr. Clark's log says: "Reception was excellent from beginning to end of test."

"The test was received throughout on a single-valve set and a small aerial, and it was not found necessary to touch the controls once after the initial tuning had been carried out."

The Technical Editor and myself were at "P.W.'s" main listening post, which was located in a suburb about ten miles west of London, and for the benefit of those who were unfortunate enough to miss part or all of our special programme, I am going to give you an "eye-witness" account of all that took place on the evening of March 18th.

Like The Local!

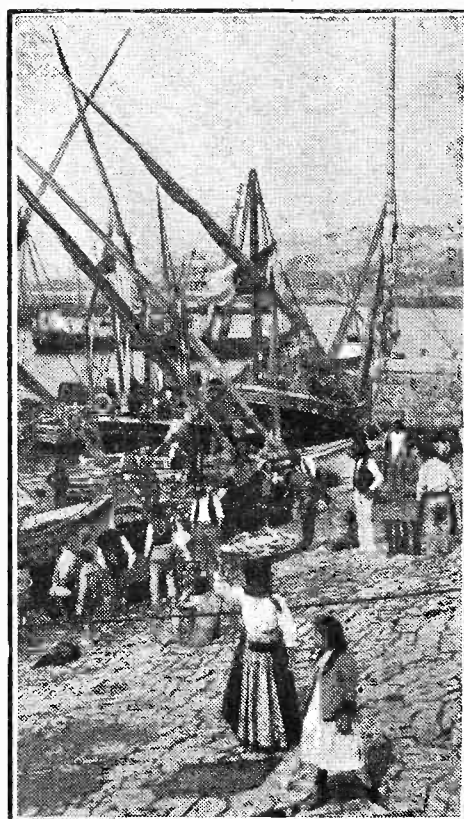
As those of you who listened will have noticed, a slight rearrangement of our published programme had been made at the last minute, chiefly to suit the convenience of one or two of the notable speakers, but apart from this, the actual composition of the programme was unaltered. On the

stroke of ten the historic broadcast commenced with a bright and breezy tune which came over at such excellent quality and strength that one might easily have mistaken it for the local station!

For Friendship Between Nations.

Then came the opening announcement, loud and clear, and almost completely free of interference and fading. "Hallo, everybody, this is CT1AA, Lisbon, Portugal. on a wave-length of 42.9 metres. To-night we are sending out a special programme for the benefit of all readers of POPULAR WIRELESS, the well-known British Radio

A SCENE IN THE SUNNY SOUTH



A general view of the beautiful city of Lisbon, taken from the harbour, which is quite near to station CT1AA.

Journal. This programme is coming from the station owned by Signor Abilio Nunes Dos Santos Junior, which is run, without commercial gain, for the establishment of closer friendship between all nations."

Immediately following the opening announcement, the address in Esperanto was given. At 10.12 came a further announcement: "You are now kindly requested to listen to the music of Portugal as played on the piano"—and very enjoyable it was, too!

The real tit-bit of the evening came at 10.25, when, following a further announcement, the famous "P.W." record was put on the air.

"Hallo, everybody, you are listening

to a special 'His Master's Voice' record, which is being broadcast on a wave-length of 42.9 metres, through the kind co-operation of CT1AA, the famous short-wave station at Lisbon, Portugal.

"This record has been specially made to inaugurate the first world-wide test of the now famous POPULAR WIRELESS 'Cosmic' Three Receiver.

"POPULAR WIRELESS, the leading British Radio Journal, is happy on this auspicious occasion to send hearty greetings not only to its many thousands of followers in Great Britain, but to short-wave listeners throughout the world.

"We now have pleasure in handing the microphone to the Chief Radio Consultant of POPULAR WIRELESS, Captain P. P. Eckersley."

And then that perfect microphone personality, Captain Eckersley!

"Well, good-evening, everybody, and thank you, Mr. Kelsey, and all that. Well—er—this is—no, it isn't Two Emma Toe; it used to be—it's CT1AA calling you."

And so he continued, as *only* Captain Eckersley could!

Our Chief Radio Consultant talked about short-waves—he talked about the B.B.C.'s new Empire station—he talked about their visions of people living in the remote parts of the Empire sitting on soap-boxes, hearing Big Ben and going all goosey down the back about the old country! He paid tribute to the work done by amateurs on short-waves, and before finally saying good-night he had a word or two to say to all "Cosmic" owners.

One can best summarise those minutes with "P. P. E." at the microphone by saying that they were typically "P. P. E."!

Following Captain Eckersley.

Considerations of space must, I am afraid, preclude all but just a brief reference to the remainder of the programme, but even so, I want to mention the items just to give you an idea of the consistency of the whole broadcast.

Shortly after 10.30 came the first group of Portuguese songs, followed at 10.40 by the address by Mr. George A. Kolkorst, who, it is interesting to note, is the Lecturer in Spanish at Oxford University.

At the "half-time" at 11 p.m., when the second group of songs was broadcast, signals were even better than they were at the commencement of the broadcast. And so far, as far as we were concerned, nothing had marred the programme beyond, at one time for a few minutes, the key clicks of a near-by amateur transmitter!

At 11.14 we were "kindly requested to listen" to a talk by Doctor Penha Garcia, the Director of the Lisbon Agricultural Society. Doctor Garcia's historical review of the associations between Portugal and England proved to be most interesting.

Pals With Portugal.

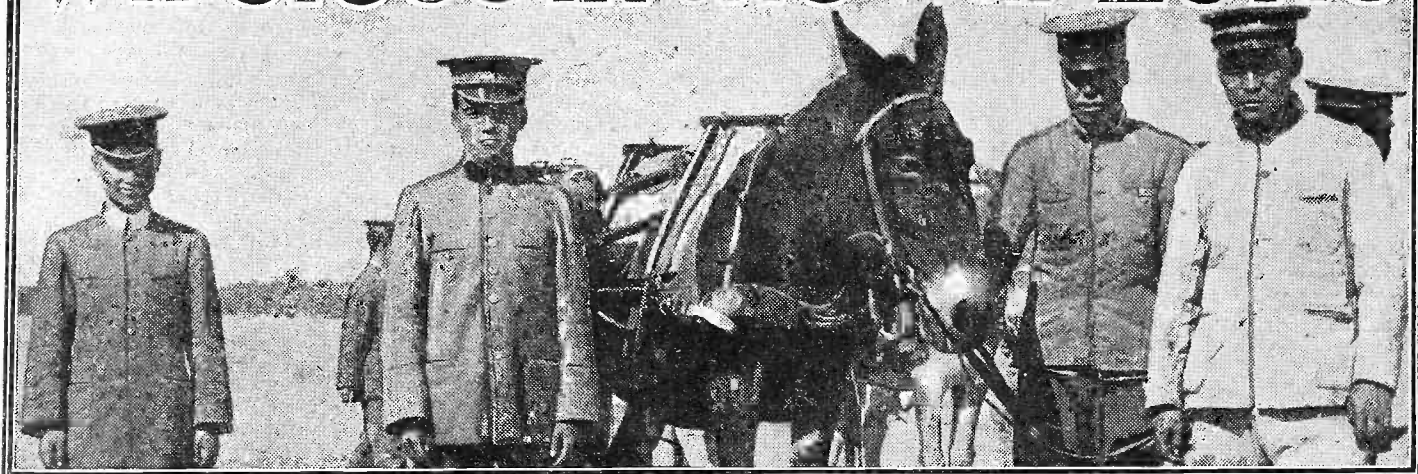
He expounded his reasons for thinking that the English understand the feelings of the Portuguese better than any other nation in the world, and he concluded by saying that he hoped that this spirit of close relationship might ultimately lead us to the great Commonwealth of Nations.

We must confess that the idea of "P.W." filling the rôle of a radio League of Nations had not previously occurred to us!

At 11.22 we were entertained by piano-forte music of the Sunny South, followed,

(Continued on page 108.)

Wireless in the War Zone



THE importance of wireless in modern warfare can hardly be estimated; so necessary has wireless become, in fact, that it is doubtful if a war could be waged at all nowadays without the aid of wireless, and certainly the side which makes the most of its wireless has a great advantage over the enemy.

That the Japanese have developed wireless to the fullest possible extent was amply

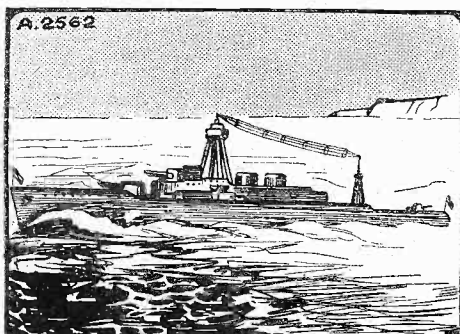
Recent happenings in the Far East have done much to prove the value of radio in the field. In fact, present-day warfare depends on this form of communication to a tremendous extent, tanks, aircraft and even infantry units being equipped. You should read this article on an all-important subject.

By Our Special Correspondent.

lines indicated by the previous war experience of the legionaries, then we may expect the foreign experts to teach the Chinese all there is to know about the use of wireless in warfare.

Since the Great War enormous strides have been made in wireless as a weapon of

EXPERT TELEGRAPHISTS



The Japanese make splendid telegraphists, and their naval and mercantile marine operators are renowned for their accuracy.

demonstrated in our own late war when the Japs were our allies. In fact, the writer obtained personal experience of this efficiency from the Japanese destroyers when operating in the Mediterranean. Their telegraphy is almost perfect and as even as an automatic machine, as anyone who cares to listen to the incoming and outgoing Japanese liners can tell for themselves.

A System of Their Own.

Although the Japanese have largely copied our western ideas in wireless, they have also developed a wireless system of their own, and in the case of wireless telephony were just as early in the field as ourselves.

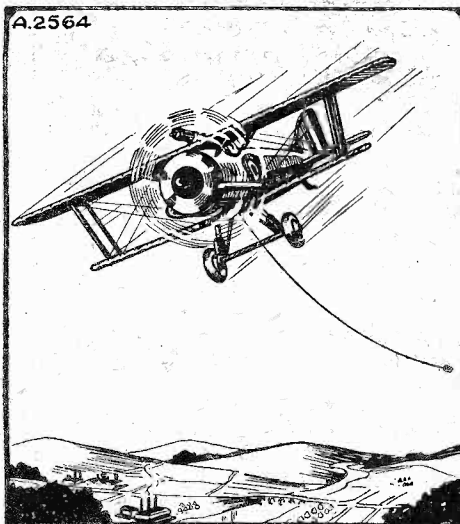
The Chinese, of course, are not so forward despite the interesting fact that they had a highly developed civilisation thousands of years ago, and used gunpowder and an early form of motor-car when our ancestors were running about in tiger skins. It is remarkable that they did not hit upon wireless, for they knew something about

magnetism: perhaps they did, for who can tell what is buried in the records of that vast and mysterious country?

What the Experts Will Do.

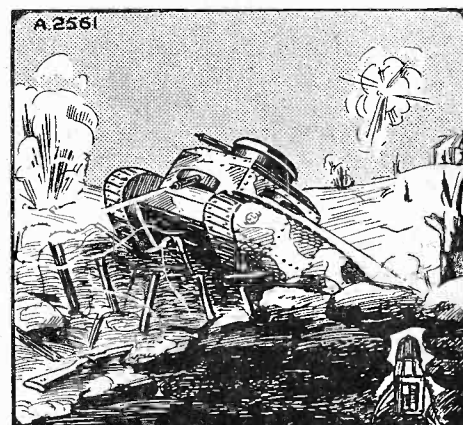
However, it is reported that large numbers of Americans and Canadians have crossed the Pacific to join their ranks, together with German war experts; and amongst these foreign legionaries there will certainly be some radio experts. If, therefore, the Chinese continue to develop their armaments and increase their armies along

A TRAILING AERIAL



Practically all service aircraft are fitted with wireless in these days, the aerial sometimes taking the form of a trailing wire with a weight on the end.

GUIDED BY RADIO



Tanks can now be kept in constant touch with their headquarters while in action, and aircraft working in co-operation can direct them on their right course.

war. Although radio telephony was used fairly extensively towards the end of the conflict, it was only in its infancy stage; and the valve, which had been introduced in 1915 (many will remember the early valve, the product of Captain Round's fertile mind, which required the heat from a lighted match to make it function properly), was still very much of a mystery when the war came to an end.

The Greatest of Applied Sciences.

To-day the valve is a highly-developed piece of apparatus, thanks to the fillip which wireless received in the Great War plus the development of broadcasting. And radio generally has become perhaps the greatest of the applied sciences with far greater possibilities where warfare is concerned than ever before.

The most valuable side of wireless from the point of view of warfare is in the realm of short and ultra-short waves. Short-

(Continued on next page.)

WIRELESS IN THE WAR ZONE

(Continued from previous page.)

wave telephony has now become a fine art, and although there is always the risk of the enemy overhearing one's conversation, this possibility is infinitely more remote than it was in the Great War, where enemy interception of wireless messages was a very important section of the campaign. (Special wireless receiving stations were dotted along

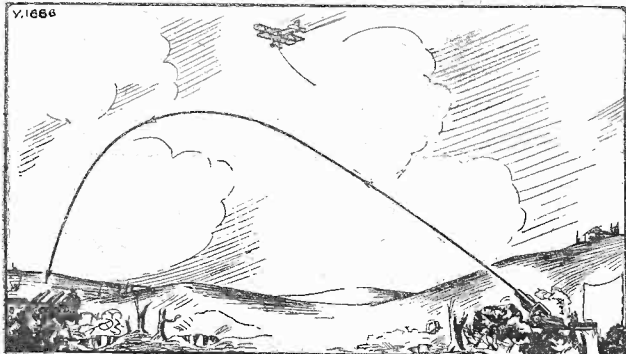
make interception by the enemy a very difficult proposition in present-day warfare.

Keeping in Touch with Tanks.

Nowadays both tanks and aircraft can keep in almost perfect touch with their headquarters by wireless. In the case of tanks this is invaluable, for whereas in the last war our tanks were greatly hampered by having to work "blind," now it is possible to give them instructions as to direction, boggy ground, and so forth, from aircraft working in conjunction with them.

Apart from ordinary communication, wireless on aircraft is indispensable for spotting long-range guns. That is to say, the observer in the aircraft which is flying high up in the heavens, but as nearly over the target as he dares, instructs the gunners down below on the correct range and accuracy of the firing.

"SPOTTING" FOR THE BIG GUNS



An extremely useful job for radio-equipped aeroplanes is to "spot" for the big guns. The observer in the machine wirelessly to the gunners and tells them if their shells are hitting the mark, and gives them information that will assist in finding the range.

the coast lines of the belligerent countries whose sole purpose it was to pick up enemy signals and decode them.)

Some ultra-short waves have an absolute maximum range of a few miles, which can be adjusted to almost fixed limits, and these, together with the many more or less secret devices which can be incorporated in the wireless apparatus, and which make it impossible for any but the persons concerned to understand what is being said,

Directional Radio.

Directional wireless is also of vast importance in warfare, and it is possible to guide any wireless-equipped mechanism along a safe course and thus in many cases avoid inevitable destruction. This also applies to infantry and other units who may become detached from the main force and lose their way, as so often happens.

For so small and compact is a wireless set to-day that it can easily form part of an infantryman's equipment, and although the poor trench slogger, already overburdened with what he regards as useless odds and ends, may not relish any extra weight, the wireless set may provide him with a little quiet amusement despite the strict injunctions of the "brass hats" that it is only to be used to receive army instructions.

Had the Chino-Japanese war lasted any

appreciable length of time we might have seen wireless-controlled tanks, aircraft, aerial torpedoes and battleships in action. The wireless control of machinery from a distance is now a practical possibility, and aircraft carrying large stores of bombs can be made to fly over hostile territory, drop their bombs, explosive or gas, on the required target and then return to their base.

Wireless control adds yet another terror

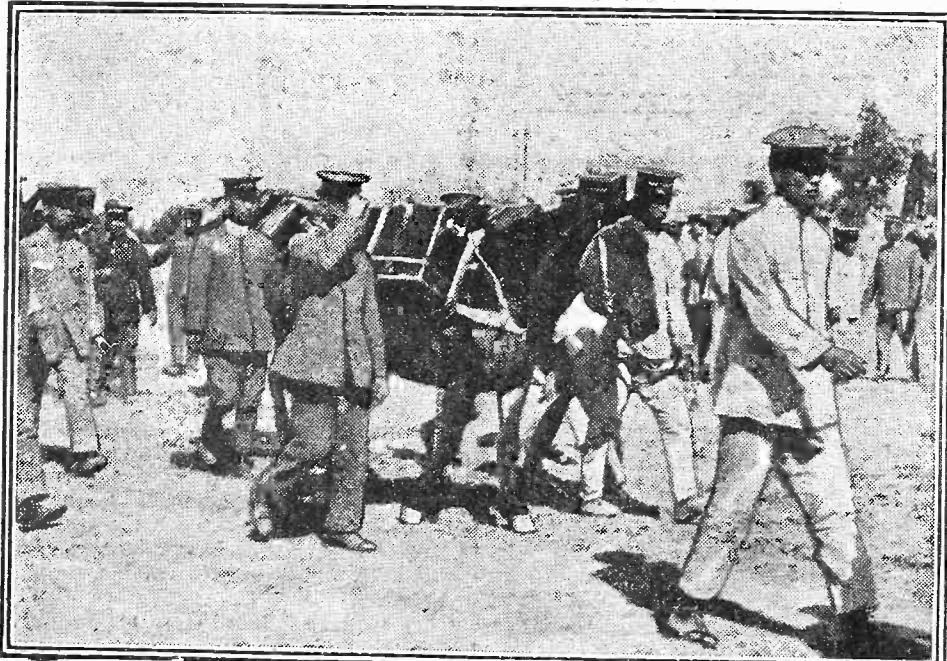
FOR THE INFANTRY



Special lightweight combined transmitters and receivers are supplied to infantry units so that the front-line trenches can keep in touch with the base behind the lines, without the bother of keeping special telephone lines maintained.

to modern warfare, as we shall certainly learn to our cost should we ever become involved in another great war. And if warfare is allowed to continue it will probably be the chief weapon of offence when fully developed, for while the defenders may drive human-controlled aircraft away, these inhuman monsters will not fear to die.

BOUND FOR THE BATTLEFIELD



The up-to-date field station is readily transported from one site to another. Here you see a Chinese portable set being carried by a mule train, en route for the battlefield.

"PERFECT SELECTIVITY"

Read what this "Cosmic" enthusiast thinks of his set.

The Editor, POPULAR WIRELESS.

Dear Sir,—Just a few lines to let you know I made your "Cosmic Three," and I got it going splendidly yesterday (Friday), and I must say it is all you claim it to be; it is just perfect in tone and selectivity. I should have got it going before only I was waiting for the Extender. I have a Cydon Extender in and can listen to the long waves without a sign of the North Reg. breaking through, and I am using the 5 to 1 transformer in the last stage, and there are short-wave stations on it at every turn of the dial. I am only using a 2s. choke and have just bought a Mullard P.M.2 det. valve, and all the stations come in about the same on the dial as you mentioned in POPULAR WIRELESS, with plenty of volume. I use my moderator tapping at the bottom of the coil.

Wishing your paper every success.

E. WRATHALL.

Skipton, Yorks.

TWO TONE TIPS

The maximum values desirable for potentiometers used with pick-ups vary, so the manufacturers' observations or recommendations should be followed as closely as possible.

If you like plenty of "top" in your reproduction do not use long twisted flex leads for the loudspeaker, as this has a rather high self-capacity which acts as a shunt across the instrument.

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.

Results Without an Aerial.

A. N. (Hendon).—"I am rather puzzled with my two-valve set. I can receive the two Brookmans transmissions at excellent volume without an aerial or earth.

"This being so, why is it that people use aerial or earths at all? I can hear no difference in the results when I join up the aerial."

Yes! But you are at Hendon and many milli-volts are established by the nearby Regional station around your aerial and around your set.

The coils in your set are exposed probably, or at least a part of your circuit is exposed, and the field is so great that the coils and/or other exposed parts of your circuit pick up currents DIRECT because the field is so strong. If, as it is good style to do (but, of course, more expensive), your circuits were all screened, then an aerial is necessary.

If, also, you were to live in (say) Southampton, the field would be weaker, when an aerial would be necessary, the coils and exposed part of your circuits not being a sufficiently sensitive form of pick-up without the additional help from an aerial.

What was wrong?

P. G. R. (Winchester).—"I recently purchased a new output valve of good make and found that signals came through at good strength and free from distortion for about twenty seconds. Suddenly the signals ceased and the milliammeter in the output stage read 120 m/a. (its maximum reading). I switched off, and after five minutes switched on again, and the same thing happened.

"If the new valve is the cause of the trouble, what is likely to be wrong with it?"

Looks rather as if the valve is giving trouble by going "soft," or looks as if the negative grid potential comes off the grid.

An output valve is usually fairly high-powered and it may be a bit more difficult to pump "hard." But, of course, 99 per cent of such valves are perfectly all right; occasionally one may get a dud.

When a valve is soft it means that there's some gas left inside, and this gas breaks up into ions which carry lots of electricity rather faster than the ordinary electrons emitted by the filament can do through the true vacuum. But if a soft valve behaves incoherently, the hard valve is the only workable proposition.

But after all that, it may be as I said, that the valve is perfectly satisfactory and the grid-bias battery is failing or the grid connection is broken.

Potentiometer Value for Last Valve.

A. B. (Bradford).—"I am going to use a directly-heated output valve with automatic grid bias. The secondary of the mains transformer is not centre tapped, and it will therefore be necessary to use a potentiometer across this winding. Is a standard

resistance of the two halves of 200 ohms in parallel).

Then the heating current wasted in the potential divider is less when the resistance is high. Of course, the higher the resistance the more difficult to find the midpoint for hum balance, so lower values are often used, but it'll be quite all right with 200 ohms.

Capacities for Decoupling.

W. A. J. (Cardiff).—"My detector and 2 L.F. set was rather unstable, so I fitted an "anti-mobo" device. This was not really effective until I increased the by-pass condenser to 4 mfd. In a previous case of L.F. instability a 2 mfd. condenser proved quite effective.

"Why should it be necessary to use a larger condenser in one case; or is it that there are varying degrees of instability, and the size of the by-pass condenser has to be varied accordingly?"

Certainly there are varying degrees of instability. Motor-boating is caused by low-frequency oscillation building up and killing itself at fairly infrequent but regular intervals. I mean the oscillation quench sequence is of the order of $\frac{1}{2}$ to $\frac{1}{10}$ second. But it's the oscillation you've got to stop, and obviously this may want more or less stopping, according to the reaction.

The Jumping Dial Readings.

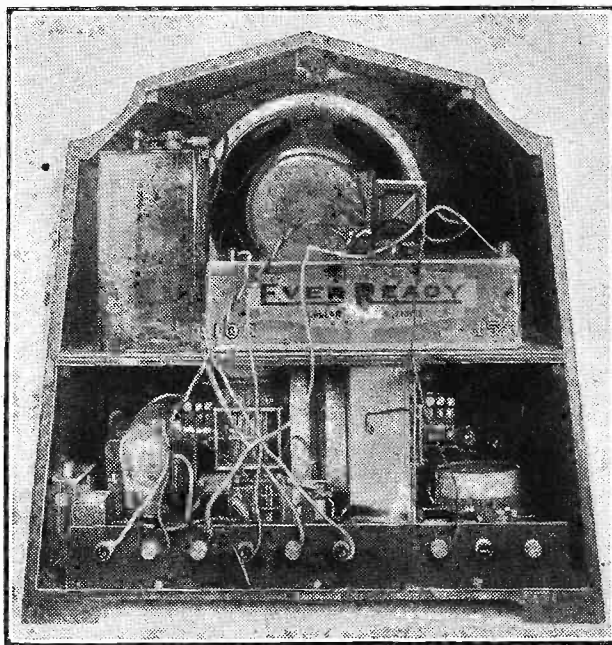
N. L. (Brixton).—"Although my receiver has given great satisfaction for the past year, recently I have noticed a peculiar effect which I have been unable to remedy. If I tune the receiver one evening to, say, the London Regional, and leave the dials set until switching on the next day, I quite often find that the dial

readings have to be altered a certain amount—sometimes as great as five or six degrees.

"Although I have carefully examined the receiver, I can trace no fault and should be pleased if you could offer some suggestion as to the cause of the trouble."

It's a bit difficult because I do not know the set, the circuit or the circumstances in detail. One possibility is that the aerial is touching something damp or semi-conductive. Or the earth lead may be broken, or if a buried earth plate is used, this may, at times, be dry—sorry, not enough evidence for good diagnosis.

DODGING BOX RESONANCE



Now that the practice of concentrating batteries, set and loudspeaker in one cabinet has become so common it is worth bearing in mind that if box resonance is to be avoided, it is a good idea to leave the set open behind. Or if you have a back, see that a number of large holes are drilled in it.

potentiometer of 200 ohms or so suitable?"

200 ohms will be quite satisfactory. It has to carry only the feed current, and there won't be much voltage drop in 50 ohms (the

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"

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

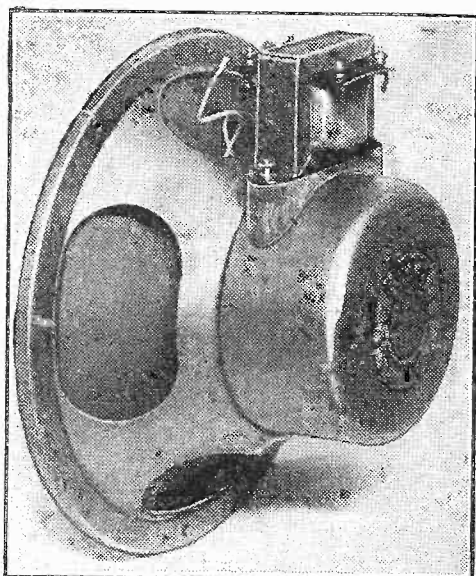


MOVING-COILS FOR ALL.

I BELIEVE we owe more to the Epoch people than anyone else for the popularisation of the moving-coil loudspeaker, for, if my memory serves me right, it was the Epoch Radio Manufacturing Co. which led the way in the production of high-class instruments of this nature at prices within the reach of the average listener.

Certainly it was Epoch which produced

THE EPOCH J.1



The latest representative of a famous family.

the first, or one of the first, practical permanent-magnet models, and it was not until this alternative to the "electric pot" was available that moving coils could be used by the majority.

However, Epoch has not rested on its laurels, for, with the Epoch J.1, it presses a further step forward.

The J.1 unit costs only 45s. complete with a three-ratio input transformer, and therefore is all ready for "matching" to either a pentode or power output.

It is particularly clean in design, and its heavy cobalt steel permanent magnet is attractively encased by a well-finished aluminium covering.

Another special feature is the provision of a one-piece linen diaphragm of the stiffness and angle to give good high-note distribution.

We have had one of these Epoch J.1 loudspeakers on test in the Research. Dept. for some considerable time, and find its general qualities to be on a much higher plane than those of some of the previous moving-coil instruments.

It has clean bass, is full of "attack," and is very sensitive.

All readers who are interested in loudspeaker progress should make a point of asking their local dealers to demonstrate this Epoch J.1.

PEAK CONDENSERS.

These are made by Wilburn Products, and are available in .1-mfd., 1-mfd., 2-mfd., and 4-mfd. capacities, at 1s. 10d., 2s. 8d., 3s. 9d., and 6s. 9d.

Tested at a voltage of 1,500 D.C., these condensers are stated to be vacuum dried and impregnated with non-hygroscopic material, which ensures the indefinite maintenance of their high initial insulating values.

They are fully guaranteed for a period of twelve months. And on test I found them perfectly efficient; they hold their charges for considerable lengths of time, and thus show practical proof of their high insulation resistances, which do, in fact, reach unusually high figures. Their capacities, too, are close to specification, and they withstand voltages of the order of that one at which they are said to be tested.

EASY TERMS.

I am informed that The Loewe Radio Co., Ltd., has made arrangements enabling dealers to sell Loewe radio apparatus on deferred terms.

THE "EELEX" CATALOGUE.

The latest list published by Messrs. J. J. Eastick & Sons contains details of a number of interesting lines such as a short-wave adapter, "Byldurone" cabinets, etc., and constructors would be well advised to secure copies.

COILS FOR THE "COSMIC."

Success on such a scale as is being achieved by the "Cosmic" would be impossible without the enthusiastic co-operation of the trade.

As a matter of fact, it is true to say that the trade is the sounding-board of a "P.W." set's success, and a sounding-board which both amplifies and mirrors the reaction of the public.

We owe a great deal to such firms as, for instance, Messrs. Ward & Goldstone, who are sufficiently enterprising to prepare large stocks of special components for our star receiver designs so that the "first rush" in the way of demands can be met.

You see, there is nothing more likely to militate against the success of a new design than serious shortages of supplies of the essential components early in its history.

Potential constructors go to shops and nowhere can they get what they want, and the result is that many do not wait and others jump to the conclusion that "it can't be so good, or all the shops would be filled up with the parts 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!

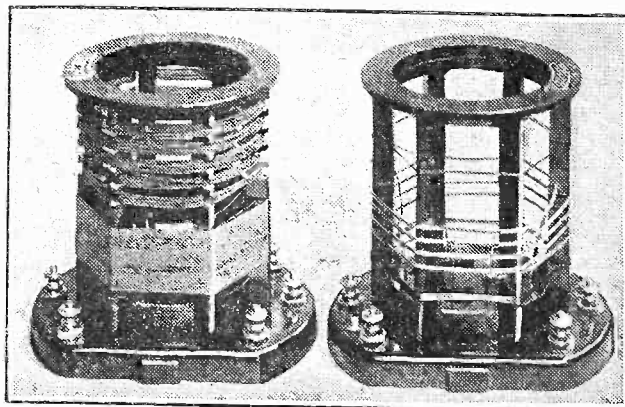
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

Naturally, when the firms who are prepared to take the admitted risk of going into production with specialised components are firms with first-class reputations and who make high-grade gear, some measure of success is absolutely guaranteed.

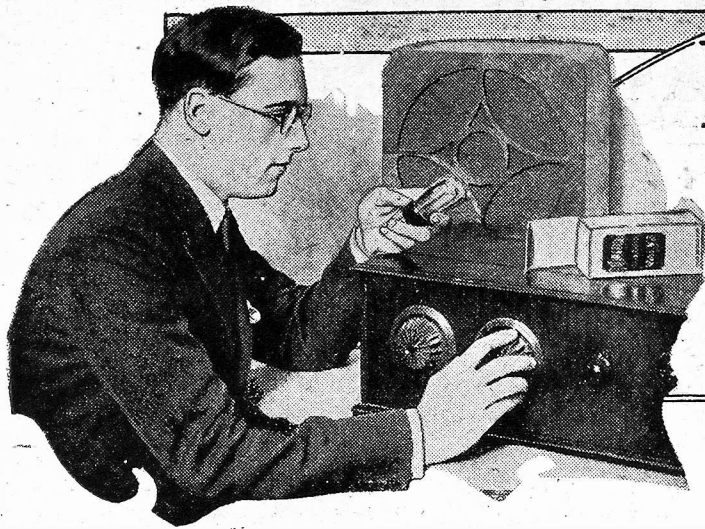
And so with the "Cosmic," for, as you all now know, this received unprecedented trade backing. Ward & Goldstone represented the North in the making of the special coils, and who could have done it better? Who is doing it better?

I have examined several samples of their "Cosmic" coils, and I find them to be of excellent quality. They are right up to the standard of our carefully constructed, hand-made original models.

ALL WAVES—NO COIL CHANGES



Messrs. Ward and Goldstone's version of the two coils which figure in the "Cosmic." These two coils enable all waves from 20 to 2,000 metres to be covered with the simplest possible switching.



KEEPING DIALS IN STEP

It will often be found that with receivers having two dials for tuning, the two dials do not keep in step over the whole of the scale, but fall out at the top and the bottom. This makes tuning more difficult for the inexperienced. Before seeing how this can be avoided, we must see exactly what happens.

Effect of the Aerial.

First of all, suppose the set is tuned in to a station near the middle of the scale, say on 300 metres. The product of the inductance and capacity in both the tuning circuits must be the same.

In the second circuit, the inductance and capacity is all associated with the tuning coil and the condenser, and while the inductance of the coil is fixed, we vary the

An explanation of why tuning dials often give different readings and how to bring them into line.

By T. P. BLYTHMAN, B.Sc.

to that of the aerial circuit and partly provided by the tuning condenser. An ordinary aerial will itself tune to about one-third the wavelength required, while the capacity added by the aerial is about .0001 microfarad. This capacity is always in parallel with that of the tuning condenser.

We can compensate for the inductance of the aerial by using an aerial coil which is smaller than the anode coil, but the capacity of the aerial cannot so easily be overcome.

Let us see what happens when we use two identical coils for the aerial and anode circuits. A medium-wave coil may have an inductance of 125 microhenries, and to tune this to a wavelength of 300 metres we require a capacity of .0002 microfarad, according to the formula: wavelength equals $1,885 \sqrt{LC}$, where L is the inductance and C the capacity. Let us suppose that the condenser has this capacity when turned to the reading 50 degrees.

A Lower Reading is Obtained.

Turning now to the aerial circuit with its tuning coil, here we have two capacities across the coil, that of the tuning condenser and that of the aerial. But since the inductance of the coil is the same, we require the same capacity across it (ignoring the inductance of the aerial).

The result is that the capacity which the aerial tuning condenser has to supply to tune the circuit to the same wavelength as the anode circuit, is less. Consequently the dial reading is less, which means that with similar coils we cannot bring our dials into step.

In order to make the dials read the same at a wavelength of 300 metres, the inductance of the aerial coil must be reduced.

But even if we adjust the inductance of the aerial coil so that the dials are in step at 300 metres, it does not follow that they will remain in step for the remainder of their range. For instance, at 200 metres we shall find that the reading of the aerial condenser is decidedly less than that of the anode condenser.

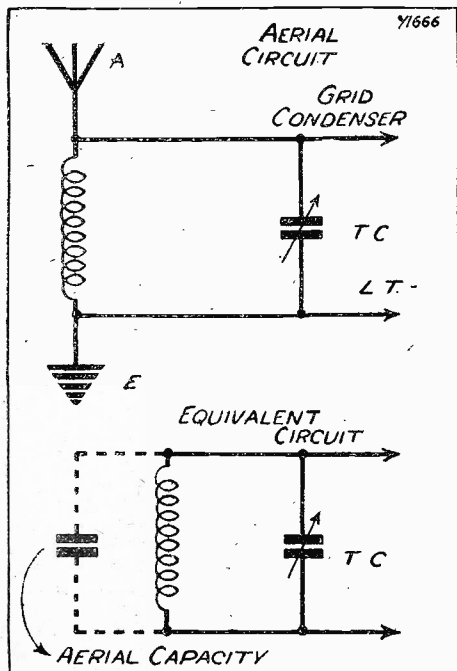
We must now see what steps can be taken to avoid the discrepancy in the readings as far as possible. As it is due to the coupling of the aerial circuit, we can reduce this coupling by inserting a fixed condenser between the aerial and the tuning coil.

Avoiding the Discrepancy.

This condenser can have a value of .0001 or .0002 microfarad, but, better still, use a semi-variable. This can be adjusted to give similar readings on the two dials near the middle of the scale, and then it will be found that the dials do not fall much out of step, as the capacity of the aerial is reduced by the small fixed condenser in series with it.

Another method is to use matched coils and condensers, having a small trimmer across the second condenser. The two condensers can be ganged together, and any small variation in capacity needed to make the circuits tune the same is obtained by rotating the trimmer. Once this is adjusted it should not have to be altered at all.

AERIAL CAPACITY



This diagram shows why the aerial condenser nearly always lags behind the other tuning controls.

capacity within the limits of the condenser, which is, say, from about .0005 to .00005 microfarad.

In the aerial circuit, the inductance is partly centred in the aerial and partly in the coil. The capacity is also partly due

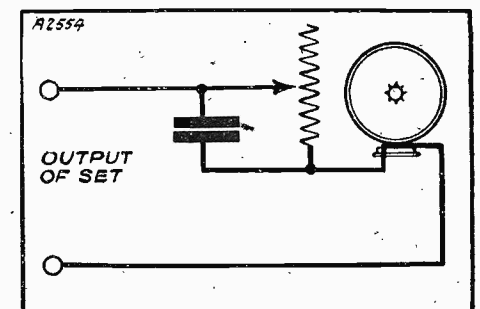
SELECTIVITY WITH QUALITY

A reader's simple tone-correction scheme.

The Editor, POPULAR WIRELESS.

Sir,—Perhaps some of your readers who do not possess sets employing the band-pass method of tuning, but who, rely on reaction in conjunction with ordinary single-tuned circuits to pick up distant stations, may be interested in the following simple

TO ADJUST THE TONE



By varying the resistance the bass response can be altered.

method of correcting the exaggeration of lower audio-frequencies which results from this method of increasing sensitivity.

The arrangement which I have had in use for some time is explained by the diagram.

Suitable values of resistance and capacity will, of course, vary with different loudspeakers, but I have found .05 mfd. in conjunction with a 5,000-ohm variable resistance very satisfactory.

Yours faithfully,

279, Thorold Road, Ilford.

D. H. PEGNUM.

WHEN our readers decide they like something, they indicate their opinions in no uncertain manner! For instance, some eight or nine months ago I introduced the "P.W." "Coil Quoit," since when, so we are authoritatively informed, no less than one quarter of a million "P.W." Coil Quoits have been sold by just one section of the trade!

Two hundred and fifty thousand—about twenty miles of them. It would be a grand sight to see the whole lot all together in one huge pile—many a mickle making one whole whale of a muckle. But, on second thoughts, it is grander still to be able to think of a quarter of a million Coil Quoits

have been sold in kit form, and an even larger number of "Cosmic" coils have passed through the post and over shop counters, but it seems the Moderator tops the lot, and is still in the nature of a best seller.

And yet we have so far not said a word in "P.W." about its use for other than "Cosmic" purposes!

Which all goes to show that "P.W." readers are quick to appreciate a good thing when they see it. For undoubtedly the Moderator is the big feature of the "Cosmic," although, as it is such a simple device and so inexpensive, I have hitherto hesitated to give it the prominence it really deserves.

But I should have been forced to write this article if only to describe exactly how Moderators should be used with ordinary sets, for it is obvious that large numbers are being purchased for this purpose. At the same time, there is no reason why I should not "Moderate" for the benefit of new readers who may have missed the "Cosmic" articles.

An Urgent Need.

First of all, a few words as to the origin of the scheme. During the latter months of last year it became increasingly obvious that the day of the simple, single-circuit tuning arrangement, such as figured in that colossally successful "P.W." receiver the "Magic," was drawing to a close.

With more and more stations being erected in Europe almost week by week, and transmitting powers going up in existing stations almost as rapidly, the demand for selectivity became more pressing.

Band-passing offered an excellent solution, but at its best band-passing necessitates two-dial tuning and is above the reach of many enthusiasts owing to the cost of the components.

The Goods.

Then there was always the S.G. three type of circuit, but that is no real alternative to the good old Det.-2 L.F. of "Magic" or "Comet" calibre in regard to simplicity or inexpensiveness as the radio receiver for the million.

I can freely admit that I spent some sleepless nights turn-

ing the problem over in my mind. The result of this intensive examination of the whole matter only seemed to bring more to the front the plain fact that the ordinary single-tuned circuit arrangement, such as the normal dual-range tuner, was not capable of providing sufficient selectivity for station separation under modern conditions without a drastic loss in sensitivity.

True it might still be possible to conjure up a number of the big-power stations, but dozens of worth-while programmes would vanish into inaudibility in the process.

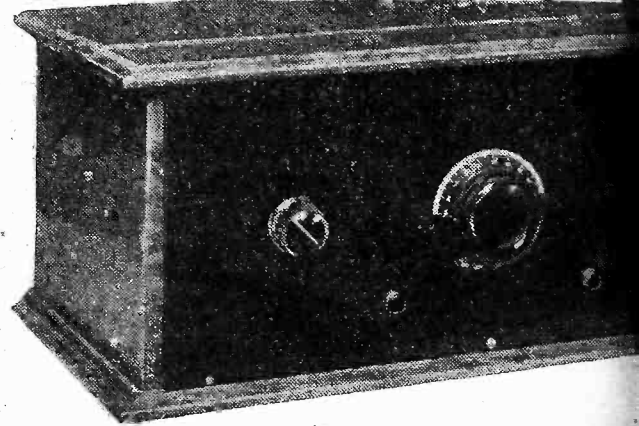
One could have shrugged one's shoulders and philosophically decided that that was very much that, and pursued a policy of making constructors pay for selectivity-plus-power in cash or extra tuning dials.

I didn't, and don't claim that my decision was based solely on altruistic principles, for "P.W." can maintain its premier position only by delivering the right kind of goods as and when wanted.

Take the father of all band-pass circuits, the old loose coupler, where you had one coil connected directly in the aerial circuit, and tuned by one variable condenser, coupled inductively to a second coil tuned by a second variable condenser.

The first variable condenser would be

MODERATOR



By G. V. DOWD

In ninety-nine cases out of a hundred, waste in the aerial, in ordinary tuning, can be obtained. But if you use the Moderator, you can recapture most of the energy lost, and the result is really astonishing. This article, for this gives you the details of the scheme, as well as details of the Moderator.

WHAT THE MODERATOR IS

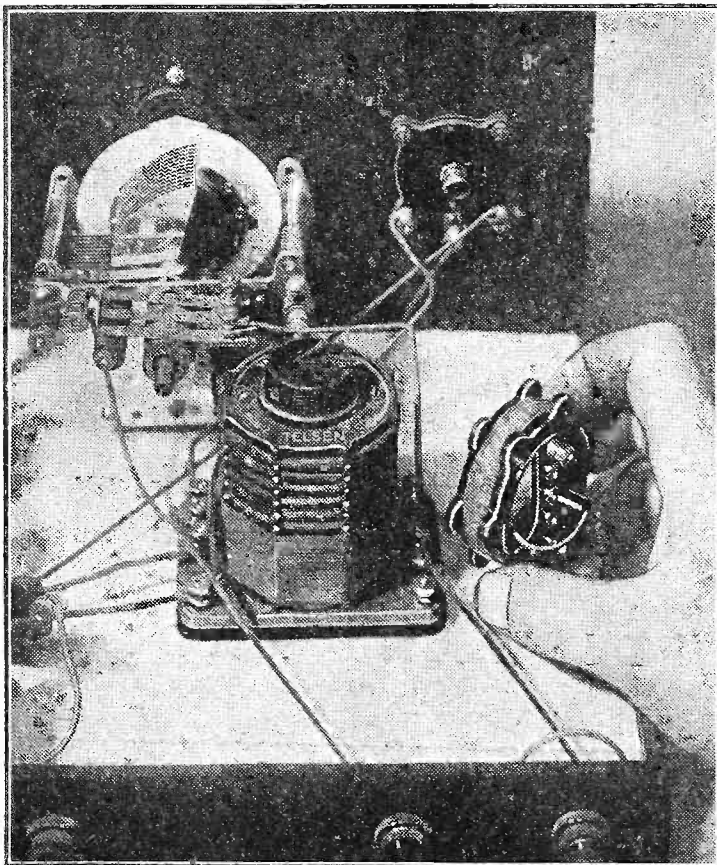
AN EXTREMELY SIMPLE BUT MOST EFFECTIVE AERIAL TUNER, WHICH CAN BE VARIABLY COUPLED TO ALMOST ANY ORDINARY COIL. THE IMPROVEMENT EFFECTED COULD NOT BE BETTERED EVEN IF THE MODERATOR WERE ONE HUNDRED TIMES AS COMPLICATED AND COSTLY

dotted all over the country, perhaps one in every house of a whole block in some particularly "P.W."-ish centre!

And now the Coil Quoit's big brother has made its appearance in the "Cosmic" Three, and this, the Moderator coil (price 2s. 6d., and a natty little job our friends the manufacturers have made of it), seems as though it, too, is determined to create records.

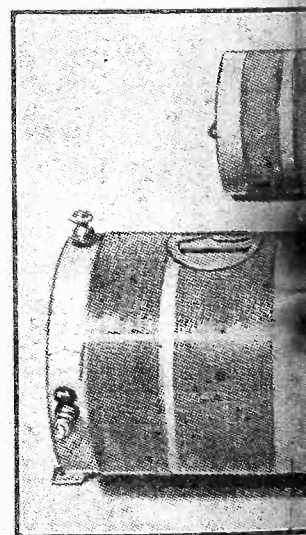
A very large number of "Cosmic" sets

YOU COMMAND THE COUPLING!



By altering the coupling between the tuner in the set and the Moderator, you control the power-selectivity ratio exactly to suit your individual conditions and requirements, merely by varying the position of the Moderator coil.

AN INFINITELY VARIABLE



With a Solenoid coil the position of the Moderator coil can be varied, and underneath you see the Moderator coil.

HOW TO 'HOT UP' YOUR

G" YOUR SET



Associate I.E.E.

hundred, power goes to at least some selectivity. Moderator you will be able energy, and also be able to separating qualities. Often but read the following technical explanation of the applying it to existing sets.

almost as flat in its tuning as the sole condenser of a single-circuit receiver. And to sharpen its tuning you would have to start throwing a way power. But you didn't have to, because the

second tuned circuit was there to provide selectivity.

Right! Let us by all means retain the second circuit, not with rather pretentious and unneeded ordinary apparatus, but with gear deliberately designed only to do all the work there is to do. You wouldn't use an ocean liner to carry you across a wide river, even if you could afford such a fantastic luxury, would you?

And thus, in brief, the Moderator system. Total cost, even if you buy a ready-made Moderator coil, five shillings. The Moderator coil is connected in series with the aerial, and this is given all the tuning it needs by one of those little solid dielectric variable condensers of .00075 mfd. capacity.

Quick Action.

Anything in the nature of a slow-motion control would be quite far-fetched, for the tuning required, even for the greatest possible conservation of aerial energy, is, as I have shown, of a quite elementary order. Indeed, it is a definite advantage that the small variable has a quick action, and automatically reduces the operation to one of settings for bunches of stations and thus

in practice resolves itself into a selectivity-volume control of an entirely non-critical order.

But, and this is an extremely big "but," the very nature of the whole idea lends it a flexibility of a surprising order for such an easily applied solution to such a difficult problem.

You see, although you do not all perhaps realise it, even "posh" band-pass and other two-circuit arrangements usually have carefully fixed couplings, for even these schemes must introduce coupling losses in order to keep the selectivity up to a reasonable standard, and to avoid double humps, etc.

With the Moderator you can arrange your own degree of coupling in quite the simplest possible manner, and have the satisfaction of knowing that you are obtaining your full power and not losing stations because the interests of Mr. Swamp-Area have had to be strongly borne in mind by the designer of the apparatus.

Facts and Figures.

Having tried out a few different degrees of coupling just by shifting the position of the Moderator coil, and decided on a tapping in the manner I shall presently describe, the following is all you have to do in operating a moderated set. Tune-in in the ordinary way with the tuning condenser and reaction control, and as you search for different stations give the Moderator condenser knob a twist every now and then.

You do not have to do this simultaneously with the normal tuning, for after a short while you will be able to fix on three or four positions of the Moderator condenser knob which will serve for all contingencies—here a position for greatest power on these stations, and there an "off-tune" position for the right degree of selectivity for that tightly bunched group, etc.

You will have that selectivity-volume compromise right under your own control.

And now for a few figures, derived from scientifically conducted tests in the "P.W." Research Department, to show you what is lost in ordinary single-circuit tuners and what is gained by moderating.

With one tuner, of

the highest reputation, used in the specified manner, no less than one whole volt of the London Regional "went west" in the aperiodic aerial circuit as compared with the full-power Moderator setting.

In another case partial tuning was afforded by a series-aerial "compression" condenser, but, even so, the Moderator beat it by half a volt. And, remember, in neither case was the selectivity up to that achieved by the Moderator's full-power adjustment!

Don't blame the tuners, they were doing their best to cope with modern conditions, but were, of course, hopelessly handicapped as compared with the "five bob" Moderator outfit.

WHAT THE MODERATOR DOES

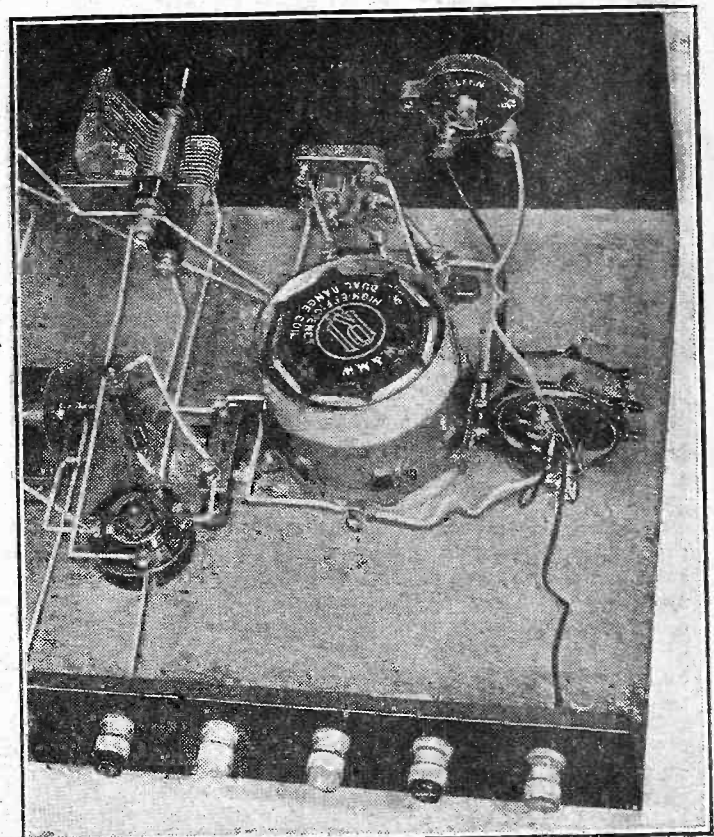
1. ADDS POWER TO A RECEIVER BY CONSERVING AERIAL ENERGY, INSTEAD OF ALLOWING SOME OF IT TO RUN TO WASTE THROUGH APERIODICITY.
2. GIVES YOU PRACTICALLY ANY DEGREE OF SELECTIVITY YOU REQUIRE.

I have said that practically any ordinary set can be moderated. Your set falls into this category if it has only one tuning condenser and either plug-in coils or a coil unit of some conventional kind.

The most outstanding example of obsolescence that I can think of is a set which uses plug-in coils and includes no panel

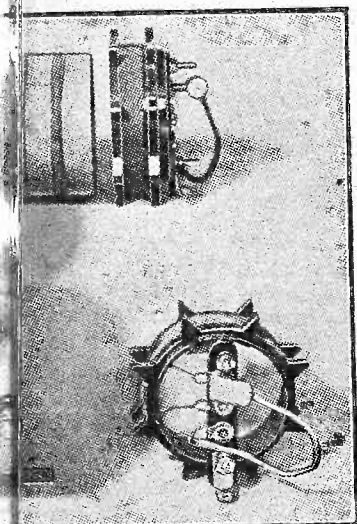
(Continued on next page.)

ONLY TWO SMALL COMPONENTS



A .00075-mfd. condenser of the small solid dielectric type, and a Moderator coil are the only items needed. And you can moderate almost any type of tuner—even those old plug-in coils.

ADJUSTMENT



Greatest power is shown at the top, position for greatest selectivity.

SET FOR FIVE SHILLINGS!

"MODERATING" YOUR SET.

(Continued from previous page.)

wave-change scheme. The Moderator condenser should be mounted on the panel as close to the coils as possible. (And this is, in fact, where it should be placed in any set.)

There may be three plug-in coils—a reaction, grid and aerial coil. If so, this last can be dispensed with for the reception of medium waves. The aerial terminal is joined to one terminal of the Moderator coil, and the other terminal of the Moderator coil is joined to the earth terminal.

For Different Coil Units.

One each of the Moderator condenser terminals is then connected to one each of the Moderator coil terminals.

If there were only two coils, one being an "X" or other tapped coil, you would not remove this, but all the connections remain the same except that the aerial lead, and not the aerial terminal of the set should be connected to the Moderator coil.

the coil to the condenser in such a way that you can make the Moderator condenser serve as a series-aerial condenser on the long waves in order to control long-wave selectivity from the panel.

You will appreciate that tuning circuits vary to such an enormous extent that it is almost impossible for me to give detailed instructions which will exactly suit every individual case.

But the whole scheme is so simple in its application that I am hoping that you will all be able to dig things out for yourselves. However, if any of you are "stumped," write a postcard to our Query Editor (marking this plainly with the word Moderator on the address side), and he will endeavour to deal with as many of these as he can in the "Radiatorial" columns. I don't suppose space will permit him to cover all cases of difficulty in this manner, but if you want urgent advice there is always our special Queries Service run by a whole-time staff of experts.

Before I pass on to the subject of adjusting and operating Moderators, I must add that inevitably there will be sets which cannot easily be moderated, but those who are doubtful on this point should watch our "Radiatorial" columns for further general notes on adaptability.

said, they can be made to reject medium-wave break-through.

If there has been a series-aerial condenser, this will still be needed for the long waves. Failing the use of the Moderator condenser for doing the work as above suggested, you can leave a series condenser in direct series with the aerial and Moderator circuit, and arrange to cut it in and out of circuit by a simple push-pull switch of the filament on-off type.

THE MODERATOR SHOPPING LIST

1 00075-mfd. solid dielectric variable condenser (Polar, Ready Radio, Telsen).

1 Moderator coil unit (Peto-Scott, Ready Radio, Sovereign).

The coil costs 2s. 6d. complete. A home-made version can be constructed with a sixpenny coil quoit (Peto-Scott, Sovereign, Ready Radio, Wearite, Goltone), and a few penn'orth of wire.

Details will be given next week.

Having built in a Moderator circuit, you will need to adjust the position of the Moderator coil so that it gives just the right degree of coupling. In order to show you how to go about this I have had several photographs taken to illustrate various positions.

I would advise you to start off by placing the coil in a "greatest power" (maximum coupling) position and ease off from this to just the extent you find necessary. It may not be necessary to ease off at all.

The next thing to do is to discover which of the Moderator coil tappings serves your aerial and local conditions best, for once this is decided upon it should not be necessary to change it.

Select two stations at opposite ends of the scale. The London National and the Northern Regional are a good pair for the job. Now vary the tapping until you locate that one which enables you to bring both stations in at their loudest at equal distances from the opposite ends of the movement of the Moderator condenser knob.

How to Handle It.

In handling this control it should be noted that it definitely tunes, even though the tuning is of a coarse nature. Therefore, the position of greatest volume and least selectivity for individual stations changes, although you need make fresh adjustments only for bunches of stations.

It is a good plan to visualise the tuning dial divided up into approximate quarters, and fix on a greatest volume Moderator adjustment for each quarter.

You can vary away from any one of these four adjustments in order to increase selectivity as occasion demands. Naturally, you will endeavour to work as close in to the greatest volume position as you can.

Well, I have had a great deal to say about a couple of components which are small in dimensions and in cost. Nevertheless, I will believe that the space has been used to very good purpose if I have put as many more readers on the road to better radio with old sets as have already purchased Moderator coils, and have shown these latter how they can employ their purchases to their best advantage.

MEASURING THE POWER GAIN OF A MODERATOR



"Moderator" improvements are real, not imaginary ones—you can hear them, and, with the proper instruments, as above, see them, shown up by a moving needle.

These connections apply identically when the tuning is accomplished by one of the older and simple types of coil unit in which there are only the normal wave-change conditions, but instead of going straight to the earth terminal you connect the Moderator circuit to that one of the switch points which joins to the long-wave primary winding or coil tapping.

You can then moderate on the medium waves and the Moderator, without any circuit alterations, will act as a rejector of medium waves when you are working on the long waves, and stop that "break through" which is so troublesome on many of the older sets.

If you like, you can insert a simple on-off switch in series with one of the leads from

It should be remembered that moderating, in its full sense, applies only to the medium waves. Full wave-change moderating is possible, but it is generally only on medium-waves that moderating can serve a vital purpose. However, as you will have noted, it is not difficult to arrange for the Moderator condenser to function as a series condenser for adjusting the long-wave selectivity.

When on Long Waves.

If yours is a wave-change set, be careful that you wire the Moderator in so that the long-wave primary coil or tapping is still fed by the aerial when you go over to long waves. The fact that the Moderator coil and condenser remain in series will not affect the long-wave volume, and, as I have

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1 Duotune Extender	15	6
1 Slow-Motion Disc Drive for above	3	0
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3 Valve Holders	1	6
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1 ReadRad Moderator Coil	2	6
1 T.C.C. .001 Fixed Condenser, Type "S"	1	6
1 ReadRad Standard H.F. Choke	4	6
1 Lewcos 100,000-ohms Spaghetti Resistance	1	6
1 ReadRad Radiogram Switch	2	9
1 T.C.C. .0003 Fixed Condenser, Type "S"	1	3
1 ReadRad Wave-Change Switch	1	6
1 R.I. Hypermite L.F. Transformer	12	6
1 Grid Leak, 2 megohm and Holder	1	4
1 T.C.C. .01 Fixed Condenser, Type 40	1	9
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OPERATING THE "P.W." "SINGLE-DIAL SUPER"

A special article dealing very fully with the adjustments and operation of the "Single-Dial Super," of which full constructional details appeared in our last issue.

By THE "P.W." RESEARCH DEPT.

EXTREMELY high amplification S.G. valves are not desirable if background noises are to be kept at a low level, although at the same time do not go to the other extreme and employ valves with poor characteristics. A combination of a Marconi or Osram S22 in the V2 position (1st I.F. stage) and a Mazda 215 S.G. in the next stage was found to be very efficient.

The most critical position is undoubtedly that occupied by the bi-grid valve, and here a Marconi D.G.2 and Cossor were found to be the best.

The High-Tension Supply.

Any good H.F. or special detector valve may be used in the 2nd detector position and, of course, there is a large variety of small power and super-power valves available for the L.F. stage. Battery consumption must be considered in this last choice, as well as volume requirements.

Where dry batteries are to be employed, it is advisable to purchase only those having double or triple-capacity cells, since the total H.T. current consumption of the set will lay between approximately 11 and 20 milliamps, depending on the combination of valves, and to some extent on the position of the slider on the potentiometer controlling the screening-grid volts on the S.G.s.

An H.T. voltage between 120 and 170 volts is advised as a maximum, and with tapings as follows: H.T.+1 (bi-grid valve), 80 to 100 volts; H.T.+2 (potentiometer for screening-grids), 90 volts; H.T.+3 (anodes of S.G.'s and 2nd detector), 120 to 150 volts; H.T.+4 (L.F.), maximum volts.

Order of the Adjustments.

Where a mains unit is to be utilised there should be at least one variable tapping, if not two, variable from 0 to 100 or 120 volts, for the H.T.+1 and H.T.+2 tapings. An Ekco D.C. 240-volt H.T. battery eliminator used with the original set was marked "S.G."—for H.T.+2, "0-120"—for H.T.+1, "120-150"—for H.T.+3 and "Power" for H.T.+4. The "S.G." tap, tested with a high-resistance voltmeter, under load, gave 90 volts and "Power" slightly over 180 volts on the 240-volt supply.

Grid-bias volts on the L.F. valve will depend on the valve maker's recommendations at the particular H.T. volts applied. Leads from the set to the 2-volt L.T. accumulator should be very substantial, as thin wires lead to voltage losses and often puzzling symptoms of "deadness" in operation.

Adjustments must of necessity be made in strict rotation, commencing with the medium wave-band.

It is best to choose a time when stations are "on the air" and then carry out the following procedure.

(1). Screw the knob on the compression condenser in the aerial lead nearly full in.

(2). Make certain the ganged wave-band switches are over to medium waves (long-wave windings short-circuited).

(3). Unscrew the minimum trimmers on the outside sections of the ganged condensers nearly full out and the centre one half-way in.

(4). Switch on the set by pulling out the on-off switch and then rotating the same knob for maximum screening-grid volts.

(5). Set the "pitch" control to minimum and turn the drum dial until the local

At some point of the "travel" a station will come in and, of course, the adjusting rod must be removed and sensitivity and volume increased by extremely careful movement on the centre minimum trimmer. Readjustments on the other two trimmers can then be tried, as well as variations of H.T. voltage on the H.T.1 tapping and rotating the volume control.

These latter operations are best tried out on powerful transmissions and repeated *ad infinitum* on weaker ones. Naturally, the weaker the station the more critical the adjustments required, and probably a further more accurate position (minute movement) will have to be found for the rotor on the oscillator coil when tuned to a low-wave station such as Hilversum on 298.8 metres.

The Long-Wave Settings.

However, once the operator is certain of his station, and that he cannot improve on the rotor setting, he should leave well alone and complete the ganging with the minimum trimmers on the condenser unit.

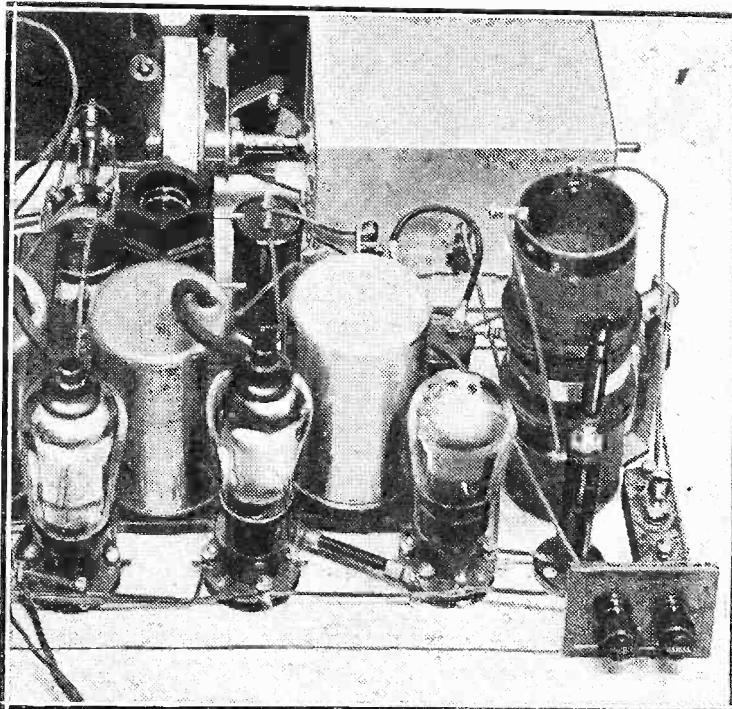
Ganging on the long wave-band is much more simple and is purely confined to rotating the wave-change switches, carefully adjusting on the compression condenser alongside the oscillator coil unit and the long-wave rotor (top one on oscillator coil).

Obviously, the drum dial must be rotated to the best position of the station it is desired to receive and the pre-set condenser referred to adjusted afterwards, in conjunction with the rotor.

A few words of warning would not be out of place: Be careful to see that the two outside minimum trimmers are unscrewed before commencing tests, because if the medium-wave rotor is adjusted for a station while they are screwed in, accurate ganging will be achieved at the top end of the scale, but the residual tuning capacity will be sufficient to prevent the lower wave stations from being received. On no account must the trimmers be touched when testing out on long waves. Fortunately, long-wave stations will be located very easily, owing first to the limited number and secondly to the fairly considerable spacing between them.

Finally, no mention has yet been made of the vernier condenser (neutralising type) across the two sections of the band-pass coil, this should be set to only a very small capacity by rotating anti-clockwise.

THE SET IS EASILY GANGED

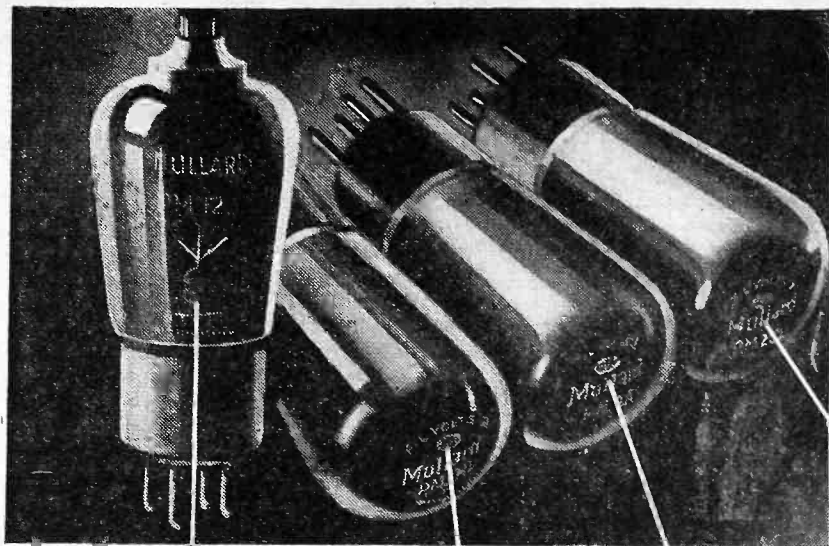


In spite of the receiver's advanced nature, it is not a difficult matter to carry out the preliminary adjustments. Once these are effected the tuning-in of distant stations is as simple as receiving the local on a crystal set.

station is heard or one of the higher-powered medium-wave stations towards the top of the scale.

If You Hear Nothing.

In the most likely event of a station not being received, obtain a long, round piece of ebonite or wood shaped to a flat at one end, or even a long-handled insulated screwdriver, and very carefully rotate the medium-wave rotor (bottom one) on the oscillator unit.



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THE · MASTER · VALVE

SO far as 1932 has gone we have enjoyed a blissful freedom from atmospheric troubles. This is a marked contrast to the conditions prevailing in 1931 when interference due to this cause was prevalent during the greater part of the entire year.

Since the beginning of January there have not been more than about half a dozen nights upon which X's have been anything of a nuisance, and they have seldom been bad enough to spoil one's pleasure in listening to distant stations. Let us hope that this happy state of affairs will continue.

Long-Wave Interference.

The increased output power of the Russian transmitters is beginning to make itself felt to no small extent. On the long waves one of these stations is sometimes to be heard fairly close to Huizen's wave-length, whilst Moscow Old Komintern is just above the Eiffel Tower, and the Trades Union station a little below Motala.

A third Moscow station, Popoff (don't you wish it would?), not infrequently heterodynes Oslo, and the unfortunate Norwegian station suffers occasionally from the attentions of yet another Russian, Tifis. Oslo is actually sandwiched between Popoff and Tifis with the 100-kilowatt Leningrad working only 53 metres (15 kc.) below the wave-length of Tifis.

On the medium band the Russians have not yet caused any great amount of interference, though I am afraid that they are bound to do so before long.

MY appeal for a "roll-call" of our H.A.C. Club members had not been very successful up to date. At the most, I have fifteen names, and I know there are at least seventy members altogether.

In response to various queries I take this opportunity of saying that the "H.A.C. Club" is open to all who can claim to have received all six continents on telephony—South America is the sixth. There is no membership fee, there are no meetings, and no privileges whatever except that one can claim to be a "hot-stuff" short-wave man!

A Colossal Log.

An interesting letter has reached me from a Dutch reader, "J. R.", of Delft. He spends most of his time listening to amateurs, and has logged 1,116 of them on the 40-metre band. Like myself, he found the week-end round February 27th very good indeed.

He wants "P. W." to print a list of amateur call-signs! Well, friend "J. R.", that would take about fifteen complete issues, with nothing else in the way of reading matter, so that I hardly think it can be done. But let me mention the Radio Amateur Call-Book, as frequently extolled by my friend "Ariel" on his pages.

Speaking of the latter gentleman, a

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.

The only long-wave station which has not been quite up to the mark of late is the Eiffel Tower, which seems to have been using rather less than his usual power. Are alterations in progress? Vienna Experimental, to which I referred last week, continues to come in well, and I hope that by this time you have made his acquaintance.

The medium wave-band has been perhaps slightly more "patchy" than it was, though really there is nothing to complain about seriously in the way in which stations are coming in. By patchy I mean that certain stations have shown big variations from night to night.

Variable Conditions.

You may, for instance, find Budapest quite weak on one night and a huge transmission on the next. Other stations which show variations are Florence, Belgrade, Marseilles and Berlin Witzleben.

It is very interesting to keep a record of these variations, for they work out rather curiously. You might expect to find that if Budapest was weak on a particular night other stations using wave-lengths near the top of the medium band and lying in the same general direction would also suffer.

barely comes up to loudspeaker strength, and Munich is better than you have heard him for weeks. Such things are amongst the interesting mysteries of long-distance wireless.

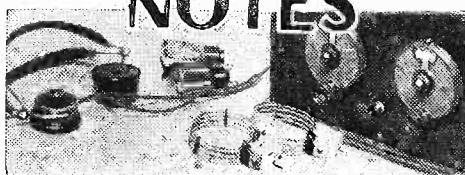
Some "Star" Stations.

The list of star stations is still considerable, and so far as I can see it is going to remain a long one throughout the summer. Stations that I confidently expect will provide good reception right through the months of longer days and shorter nights are Brussels No. 1, Prague, Langenberg, Beromunster, Katowice, Toulouse, Lwow, Hilversum, Heilsberg, Turin, Breslau and Hamburg.

At any rate they are still as good as ever they were, and except on very occasional nights when conditions are not quite up to the mark, none of them shows any signs of falling off.

There are many other stations which are still giving first-rate reception, though possibly they will not be so well heard in a couple of months' time. Amongst these are Budapest, Vienna (Rosenhugel), Florence, Rome, Stockholm, Belgrade, Goteborg, Bordeaux, Bratislava, Gleiwitz, Trieste, Nurnberg and Poznan.

SHORT-WAVE NOTES



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

By W. L. S.

reader writes to inform me that "Ariel" and "W. L. S." are one and the same, and that he has tracked them both down to a Cumberland amateur whose initials are "W. L. S."

No, sir! You are wrong on both counts, and what "Ariel" will say about it I can't imagine. The implied libel on his character—I mean the suggestion that he is mixed up with myself—is rather serious.

The "P.W." Broadcast.

I thought C T I A A came over unusually well on the occasion of the special broadcast. On my usual one-valver, he was R 7-8, and I listened most of the time with the 'phones on the side of my head. The only

bothers were a certain amount of distortion from quick night-fading, and an unfortunate "bubble" that was apparently due to a little trouble with the transmitter.

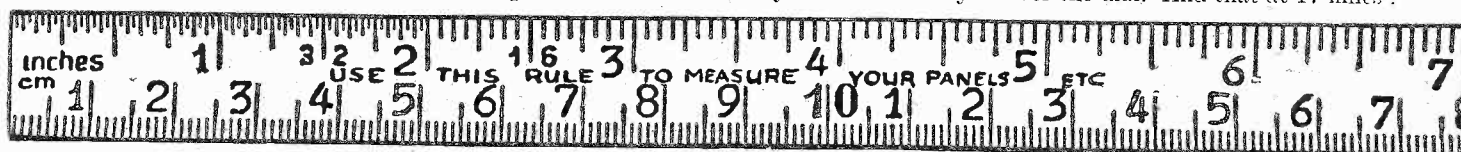
I thought Captain "P. P. E.'s" remarks on the "romance value" of short waves were very much to the point, and I thought he came over particularly well for the first half of his talk, after which a little fading-distortion set in again.

Untuned S.G. Stages.

Now for some remarks on untuned S.G. stages. I suggested one a few weeks back as a possible cure for interference from neighbouring broadcast receivers. Since then one or two readers have told me that an untuned stage only makes things worse.

In that case I suggest that the resistance or H.F. choke, or whatever they use across the S.G. valve's grid circuit, is unsuitable. Don't use a higher resistance than 10,000 ohms; if you use a choke, wind one that does not give rise to the broadcast interference. It can be done.

At my own location, if I use a resistance of 100,000 ohms across the aerial and earth in this way, I hear London National and London Regional at equal strengths all over the dial. And that at 17 miles!



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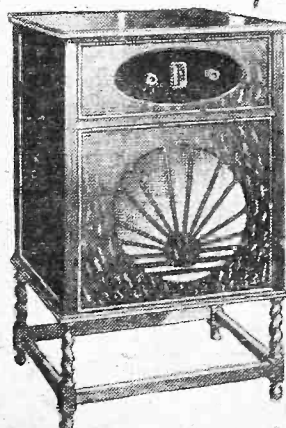
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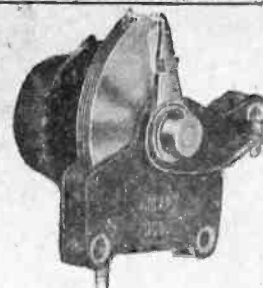
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Use Polar Condensers for the "SINGLE-DIAL SUPER-HET."

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UNIQUE-VALUE and PERFORMANCE

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Including Multi-Ratio O.P.
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Heavy super-efficient magnet of advanced design, scientifically planned, precision centered cone, carefully matched multi ratio transformer; all these contribute to the truly remarkable performance of Goodman's new Dreadnought permanent magnet Moving Coil Speaker.

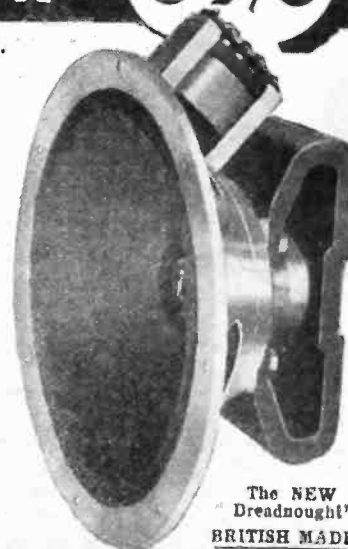
Powerful, yet acutely sensitive, it has great range, giving true crystal clear reproduction over all audible frequencies.

The result of seven years' scientific research, it embodies all qualities most desirable in a speaker, yet sells at a price within reach of all.

Supplied complete with baffle-board ready for fitting to your own cabinet or radiogram. Fully guaranteed.

The Ideal Speaker for Kit Sets.

Get one to-day. If unable to obtain from your radio shop send 39/6 direct to makers. C.O.D. if desired (or write for full descriptive literature).



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Scientific



SOME ECONOMICAL METHODS SIMPLY EXPLAINED.

THERE are doubtless large numbers of readers who still have D.C. mains, and, although on the whole it will be agreed that those possessing A.C. are much more fortunate, there is one way in which D.C. mains score.

They can be used for charging L.T. and H.T. accumulators with the aid of comparatively simple apparatus. A.C. is very useful, but for charging purposes D.C. mains want some beating.

Ideal for H.T. Accumulators.

The only thing against them is that if they are used for charging large L.T. accumulators direct they are not very economical; but, after all, that really depends upon what price is charged for electricity in your particular district. For replenishing a large number of cells or an H.T. accumulator, D.C. is ideal.

It is only necessary to connect an electric lamp in series with one of the leads, and join the positive main to positive on the

Most of you probably know already, but in case you don't I will tell you.

First of all connect an ordinary electric lamp in series with one of the mains leads as shown in Fig. 1, but leave the accumulator disconnected. Now carefully take one lead in each hand, and, with the current switched on, lower the two ends into a tumbler of water. Keep your hands dry and don't touch the bare wire.

The ends should be submerged to a depth of about two inches, and *must* be kept an inch or so apart. You will at once notice that one wire sends a stream of tiny bubbles rushing to the surface of the water, while the other one gives off practically nothing. The lead that gases freely is negative, and the other one is the positive wire.

You may wonder why it is necessary to have the lamp in circuit for this simple polarity test. The reason is that it is just a precautionary measure.

We could manage all right without it, but if the two wires happened to touch under water—or above it, for that matter—the mains would be short-circuited and there would be some “fireworks”! If they come, together with the lamp in circuit, however, the latter would simply light up and no harm would result. (If you touch the ends together, the same thing happens as when anybody turns on an electric light switch—the circuit through the lamp is completed.)

Finding the Required Resistance.

When charging from D.C. mains in this way the charging current through the battery is decided by the size of the lamp and the voltage of the battery being charged. It will be realised that as the positive terminal of the accumulator is joined up to the positive main they will be in opposition.

So if we happen to be “refilling” an H.T. accumulator of say 120 volts, and the mains are 200 volts, there is only an effective pressure of 200–120 volts, which is 80 volts. We must therefore use the right amount of resistance (a lamp is the same thing) to pass the required current at 80 volts—not at 200 volts as some of you might at first think.

Here is a simple formula which will enable you to calculate the amount of resistance in ohms required for any particular case: Resistance required, equals charging current in amperes divided into the effective voltage (i.e. the mains voltage less that of the battery).

Or, to express it in another way:

$$R = \frac{E - e}{C}$$

where:

R equals required resistance in ohms.

E equals mains voltage.
e equals battery voltage.
C equals charging current.

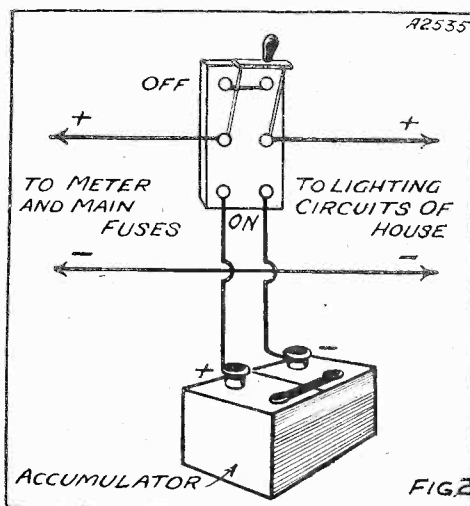
When you have decided what resistance you require for any particular case it will be necessary to find a lamp of the right size. Well, here is a list that will help you considerably:

Size of lamp in watts.	Resistance of 100-volt lamp.	Resistance of 200-volt lamp.	Resistance of 350-volt lamp.
	ohms	ohms	ohms
20	500	2,000	3,125
30	333	1,333	2,083
40	250	1,000	1,562
60	166	666	1,041
100	100	400	625

All these figures apply to both the gas-filled and metal filament type—in fact, any lamp whose rating is given in watts. By connecting two lamps in *parallel*, a current equal to the sum of the two separate currents can be passed.

There are many ways in which the enthusiast can show his ingenuity, and so make full use of his D.C. mains. One very good and particularly economical scheme for charging L.T. batteries is to connect the accumulator in series with the lighting mains near the meter.

FREE OF COST!



“Free” L.T. accumulator charging can be obtained by connecting the battery in the house-lighting circuit. There is no noticeable diminution of light from the lamps.

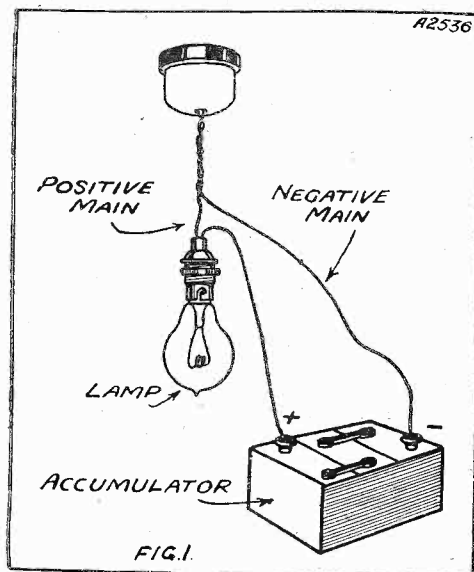
With this method, any current used for house lighting purposes passes through the battery first. It has the disadvantage, however, that charging is in progress *only* when the electric lights are switched on!

No Effect on Lighting.

It is not advisable to use this method with anything higher than a 6-volt battery, for, as pointed out earlier on, the accumulator opposes the mains voltage and the pressure left for lighting purposes is correspondingly reduced. In the case of a 200-volt supply, the effective voltage would be reduced to 194 volts by a 6-volter. But in practice this would pass unnoticed.

Fig. 2 gives the idea in diagrammatic form, but before carrying out the necessary alterations to the house wiring permission should be obtained from the supply authority concerned.

THE SIMPLEST SYSTEM



By connecting the accumulator in this manner you illuminate the room while you charge the battery! With an H.T. accumulator, however, there would be a big voltage drop and the lamp would glow but dimly.

battery, and the negative main to negative on the battery, and all is ready. If you look at Fig. 1 you will see the idea.

“That sounds very easy,” some of you will say. “But how can I tell which is the positive and which is the negative main?”

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

"In both of these you indicate an Extenser having different terminals from those supplied to me (four terminals), whose makers did not send wiring details. If you will be kind enough to give me instructions for the wiring of the four-terminal component, I shall be greatly obliged to you.

"As I have completed wiring except for Extenser and its connections and as, being a beginner, I am naturally anxious to 'make it work' as soon as I can, I shall be doubly grateful for a reply at your early convenience."

Despite the fact that the Extenser in question incorporates four wave-change contacts, instead of three, it can be used and connected exactly as the one originally chosen. (Probably the makers enclosed no details of the wiring because it is so very easy—when once you have tackled a job of this kind—to see how this is done.)

Looking at the blue print or back of the ordinary Extenser, you see the two main connections (fixed and moving) and also three wave-change, or "self-changer" contacts. One of these latter is joined to "M" on the moderator, and 1 on the dual-range coil; another goes to 3 on the dual-range coil; and a third goes to the bottom of the moderator coil, quit.

On the Extenser which has four wave-change contacts instead of three, all the connections should be made in exactly the same way, "fixed" and "moving" going as shown, and any three wave-change contacts being chosen to take the place of the original three.

It does not matter which of the four terminals are connected, so long as one goes to 3 on the dual-range coil, another to the bottom of the moderator coil, quit, and a third to "M" on the moderator condenser, and to 1 on the dual-range coil, exactly as on the blue print.

When you have finished wiring, the only difference will be that you have one wave-change contact not being used. And the others are not in quite the same position as in the original, although the connections to them are identical with the original arrangement.

MAKING A SHORT-WAVE CHOKE.

D. C. (Dublin).—"I made your 'Full-Range Junior' of December 26th, 1931, and also your 'Inexpensive Loudspeaker' of October 17th, 1931, without any difficulty, except that I could not see how to put the washers on the cone (I cut the apex of the cone to let the washers tighten, otherwise they would crumple the paper). The set works wonderfully, piles of stations being received on the loudspeaker.

TECHNICAL TWISTERS

No. 107.—GRID CONNECTIONS.

CAN YOU FILL IN THE MISSING LETTERS?

A poor connection in the grid circuit must be carefully guarded against, especially in the case of a super-power valve, because of the effect on filament

Any break in the circuit, due to defective wiring or other cause, will have a serious effect in the case of the output valve, owing to the removal of

In preceding stages the effect of a broken grid circuit will be to impair quality and strength, and usually to increase the H.T. but not to the extent that the valve is damaged.

Last week's missing words (in order) were: Plate (or Anode), Grid. Phase. Steady.

"In your short-wave set of December 26th could I leave out the long-wave choke if I did not want to get long-wave stations, and could I wind the short-wave choke with No. 30 wire? If so, how many turns shall I put on?"

If you are not going to attempt long-wave reception it should be quite O.K. to leave out the long-wave choke altogether. And we do not see any objection to the No. 30 D.S.C. especially if you make a nice, well-spaced job of the wiring.

For maximum results with the short-wave choke it would be a good plan to wind a thread of cotton of about the same size as the wire that is used, at the same time as you wind on the coil itself (about 100 turns).

To do this you simply fix the cotton to the former along with the wire, and then wind on the two together so that instead of the turns of wire touching each other as they are laid on, each turn lies beside a winding of cotton. The wire is then finished off carefully as usual, and when the former is ready for

"SHORT WAVES"

"Loudspeaker fine," runs a headline in a provincial newspaper. We wish ours was.

A suggestion was recently made that London should have a radio theatre, in which one could dine and dance and listen to the wireless.

We thought there would be a catch in it.

Perspiring Indian Chief (listening to wireless talk on "The Benefit of Sun Bathing"): "Sez you!"

"For the benefit of the non-technical, I may define Interference as the result caused when an irresistible soprano meets an immovable politician on the same wavelength. Time was when the ether was a very exclusive hostess. Stations kept their distance in those days. Now her soirées are one vast mass of wave crashers, all trying to get their programmes fitted in somehow," writes a correspondent.

"A scientist says that plants can be tickled. A suburban correspondent asserts that his aspidistra laughed outright at something said on the loudspeaker."—Humorist.

The critics of programmes are many.

The satisfied ones few—if any:

But highbrows and lowbrows

Can surely have no grouse

With programmes at three for a penny!

its final fixing, the cotton can be taken off it, leaving a spaced winding of wire and thus ensuring a low capacity coil.

GETTING DOWN TO BRASS TAPS!

It has frequently been our pleasant duty to thank readers who have discovered some more or less tricky faults in a set, for taking the trouble to write an account of their experiences for the benefit of their fellow-readers. And the Technical Query Department is often able to pass on information in this way, to the great benefit of others who may be afflicted by the same trouble.

This week we are indebted to a Cardiff reader (J. F. W.) for an excellent little reminder on the back of a postcard. He says: "Many thanks for your prompt reply. In case others get similarly troubled perhaps a note in your paper to the effect that 'an earth wire connected to a well lacquered brass tap does not earth' might help others to rectify what may be a serious trouble!"

"I removed the lacquer on Sunday with improved results!"

WHERE IS FLORENCE?

"ITALIANOS" (Stepney).—"I am especially interested in the Italian stations, all of which I have picked up at one time or another, except the new station at Florence. As this is supposed to be of the latest type, I am surprised at not having been able to secure even a whisper of it.

"Is it not in such a good position for transmission to this country, or is there some other reason for its failure to come over as

YOUR BIT TOWARDS ECONOMY

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week?

You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but you will make sure of getting your copy regularly each week.

well as one would expect from the power which is quoted as being used (20 kw.)?"

Evidently you did not notice the reference to this station made by "Ariel" in "Notes and News" recently, when he commented on the fact that Florence at present is using only a temporary aerial. It is quite likely that this means that only reduced power is used, and if so there is certainly no need to be surprised that Florence is rather coy, because either the imperfect aerial or the reduced power would greatly mitigate against long-distance reception.

We understand that the aerial system is likely to be improved shortly, and we shall be surprised if, as a result, Florence does not then give a very good account of herself.

THE BULGIN POTENTIAL DIVIDER.

Will readers please note that the price of the Bulgin Potential Divider reviewed on page 12 of our March 19th issue is 7s. 6d., and not 3s. 6d., as erroneously stated.

MIRROR OF THE B.B.C.

(Continued from page 94.)

dialogues called "Artists at Work," the intention of which is to give the artists, through interviews by Mr. Stanley Casson, of New College, Oxford, opportunities of expressing their points of view about art. Sculpture will be represented by Mr. Frank Dobson, etching by Mr. Henry Rushbury, painting by Mr. Albert Rutherton, and portrait painting by Mr. Edward Halliday.

Another series of six talks will also be given on Tuesday evenings by various speakers on "Life Among Native Tribes," which will consist of simply-told stories about the life and customs of various African natives.

Must Britain Starve?

At least two discussions will be included in a series of talks arranged to be given on Wednesday evenings by Sir John Russell, F.R.S., Director of the Rothamsted Experimental Station, under the title of "Must Britain Starve?"

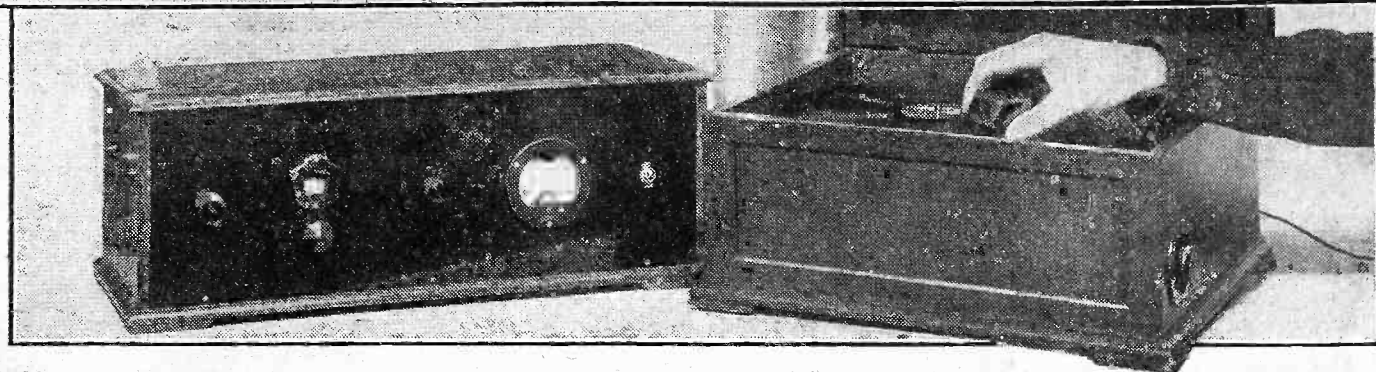
The agriculturist may be inclined to regard these talks as his own, but most of us are alive to the importance of a proper study of the needs of rural populations, tariffs for agriculture, and the distribution and the marketing of farm produce.

In May and June this series will give place to six talks by Mr. A. Lloyd James on "Speech in the Modern World," in which he will discuss questions of pronunciation and dialect, speech structure and standard English.

Two groups, each of six talks, will combine to make an important series on historical matters for Thursday evenings, with Mr. J. L. Hammond first discussing the growth of the modern world order and showing the part played by Great Britain, and secondly Professor Arnold Toynbee discussing the disintegration of the modern world order.

(Continued on page 103.)

RADIOGRAM REMINDERS



I HAD intended to go into the question of battery radio-grams this week, but there are one or two other points I want to discuss first, so it will have to wait.

Many gramophone owners will probably think that I am faddy, but the dusting of records with the velvet pads supplied by gramophone dealers is really worth while if the records are kept, as so many are, where they can collect dust.

You will probably be tempted to say that a little bit of dust can make no difference to the playing. It won't—to the playing of the record at that particular time, but if the dust is not removed it will surely cause increased wear, and that will have a very marked effect on the reproduction.

Removing Dust From Records.

The average gramophone will probably not show up the roughness caused by continual use of a dusty disc, but the more sensitive pick-up will, and the result of such wear will be harsh reproduction that will completely spoil the record.

But there is an art even in the wiping of a record. For if you do this too vigorously you will more than likely increase the amount of dust on the surface instead of reducing it. This is because the disc will become electrified by vigorous rubbing, and this electrification will attract small particles of dust that are floating in the air, and add to the dirt already on the disc.

That this is so can easily be proved, especially if a dry silk cloth is used to rub the record. After a few seconds vigorous polishing you will find the disc beautifully clean for a few seconds, and then, ever as you watch it the record will collect an amazing amount of dust, and the state of the disc will be worse than before.

The Correct Way to Store.

Dust is a wonderful abrasive, and in the grooves of a gramophone record will greatly assist the needle to wear away the walls.

While talking about records, let me warn those who keep their discs in albums that these must be kept upright, and not leaning or piled on one another if they are to preserve the records from warping.

The best method of storing records is to keep them in stiff card covers on shelves, the records being stood on edge, and kept perfectly upright. There are, of course, elaborate storing cabinets that enable you to get which record you require at a moment's

Some further notes on the practical side of radio-gramphonics, raising some points that have a direct bearing upon the economics of the question.

By K. D. ROGERS.

notice by just pressing a small lever; but these, made by H.M.V., are expensive, and though they are excellent they are rather a luxury.

Record life is a thing that is of vital importance to most of us, and this is wrapped up not only in the way the records are stored, but also in the way they are played.

HAVE YOU TRIED THESE?

VOCAL

Ginehy Road	Peter Dawson	H.M.V. B4089
Home	Gracie Fields	H.M.V. B4101
Tregs	Derek Oldham	H.M.V. B4091

ORCHESTRAL

Old Vienna	De Groot	H.M.V. B4092
Moon		
Savoy Welsh	New Mayfair	H.M.V. B4023
Medley		

DANCE

Sleep on	Ambrose	H.M.V. B6142
Goopy Geer	"	H.M.V. B6143
Dancing in the	"	H.M.V. B3132
Dark		
Washboards	Washboard	H.M.V. B6114
Get Together	Serenaders	
(hot number)		

This is, of course, obvious. But what is not so obvious to many people is the very real importance of the gramophone needle being used exactly as recommended by the manufacturer.

It has been said on more than one occasion that the exhortation to use the needles "on one side only" is a business wangle to sell more needles. Let me assure those who think in this wise that although the aforesaid companies are not philanthropists nothing is further from the truth.

The changing of the ordinary needle (steel or "talkie") after each side is a real necessity, if long life is to be granted the record. The normal needle soon gets chisel-shaped, and running it more than one side

means that you have a very flat point for the second side.

Don't Turn the Needle Round.

This is bad, because it does not give the needle a chance to grind itself into the groove, and so the walls of the grooves are being constantly worn. Turning the needle round a little is worse than running it as it is, for it has the effect of turning the chisel-edge more or less in line with the grooves, and so it commences to act as a cutter, with obviously disastrous results.

The tungstyle needle, however, removes the bugbear of needle changing, and allows a large number of records to be played without any change. True, the advertised 150 playings can rarely be obtained in everyday practice, but you should be able to get between thirty and fifty out of each needle.

Treated carefully, this type of needle is a boon, but it must not be handled roughly or it will be a real danger. The point of the tungstyle needle is of thin tungsten wire, and this is easily bent if it is knocked or dropped on to the record carelessly. Also, the needle must not be taken out of the pick-up and then reinserted, as it will be practically impossible to put the needle back exactly as it was before removal—which is essential to both the life of the record and to the tone of the reproduction.

A Neat Cup-Fitting.

We have been talking about needles, and the "dire catastrophies" that overcome those who use old or damaged specimens, so it is not out of place to mention here the neat and inexpensive needle container recently placed on the market by Messrs. A. F. Bulgin & Co.

It takes the form of a brown bakelite moulding that can easily be screwed on the motor board, and which holds two cups; one for new needles and the other for the used ones. It obviates the need for drilling the motor-board in any way, a necessity if the ordinary type of needle containers are used.

The price, too, is very attractive, being only 2s. 6d. for the complete outfit, with its two cups holding something like 150 needles. It should be extremely popular among radio-gram users.

There is nothing worse than not having a receptacle for old needles handy, and it is the surest way for some of them to get used a second time.

MIRROR OF THE B.B.C.

(Continued from page 106.)

Science gets its place on Fridays with two series of talks by Professor James Ritchie of Aberdeen University, and Sir J. Arthur Thomson, dealing, respectively, with the everyday facts of natural history and the problems which arose from man's interference with wild life, and the life and work of six great investigators, including William Harvey, Pasteur and Huxley.

In addition to all the talks I have mentioned, the usual courses in French and German language teaching will be continued and concluded on Tuesday and Thursday evenings respectively, at 6.50 p.m.

Group-Listenings Great Progress.

Is it to be wondered at that with such an array of talks that group listening is sweeping through the country like a prairie fire? Every region reports great progress, but none is doing better than the North, where since Christmas the number of groups in the North-Western area, which embraces Lancashire, Cheshire and Westmorland, have increased from eighty to ninety-four.

One group, which meets at the Ancient Chapel of Toxteth, Liverpool, has secured, through the Minister, the Rev. F. Heming Vaughan, the collaboration of many distinguished men in Liverpool, one of whom will attend each week and speak. Another group which meets at the Edge Hill Women's Training College, in Liverpool, is trying the experiment of splitting up into three small sections, each discussing a different aspect of the broadcast talks

they hear, and afterwards communicating the results arrived at to the whole group. In Yorkshire group listening is taking a permanent place in the educational activities of the county, the number of groups having increased by as much as three hundred per cent in the last year. Forty new groups have already been registered since January 1st.

The Deaf Join In.

The most remarkable among them is one in Sheffield, consisting of deaf and dumb people. The method adopted is for the leader to interpret by signs the words of the speaker as the talk is being given. (In this way the group was able to follow every word of the Prince of Wales' recent broadcast speech.)

I mentioned at the time the scheme started in the New Year to develop group listening during the morning among unemployed men. Already nearly twenty centres have been started with a registration of thirty groups.

Another indication of the importance of group listening will come out on Saturday, April 2nd, when a conference of group leaders is taking place at Leeds.

DID YOU LISTEN TO LISBON?

(Continued from page 88.)

at 11.32 by some very tuneful guitar music. As a matter of interest, may we just mention in passing that the guitar music was another one of the items which might pardonably have been mistaken for the local station, except that—well, it was *real* guitar music!

In drawing up the original programme for "P.W." we perhaps rather rashly invited readers to join in the popular songs of Portugal which were broadcast at 11.38. The fact of the matter is that we had not then heard them!

Not that the Portuguese Fados, as they are called, are not tuneful. On the contrary, they are particularly melodious, but to join in the choruses, well—that *would* have set the baby off!

A Fitting End.

The programme between 11.38 and 12.3 was almost wholly devoted to these songs and tunes of Portugal, rendered with guitar and voice, and as a happy relief from the—dare I say—monotonous programmes of our own broadcasters, they proved to be particularly enjoyable.

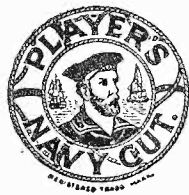
At 12.8 came the end of what I personally regarded as a most enjoyable evening, and that is an expression of opinion with which I am convinced that everyone who heard our programme will agree. And quite a homely sort of ending it was, too.

By Way of Conclusion.

Just a simple announcement: "Ladies and gentlemen, our special programme organised in co-operation with POPULAR WIRELESS is ended." And then, something which is *no* homely but which ought to be: "Ladies and gentlemen, the King!"

Well, the show is over, and all that we wish to say by way of conclusion is that we hope you all enjoyed it as much as we ourselves did. And let us hope that it may not be long before something else on similar lines can be arranged!

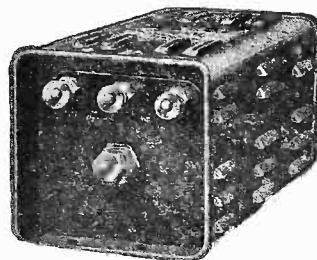
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THE LISTENER'S NOTEBOOK

(Continued from page 94.)

Despite his excellent voice, a little of him goes a long way.

Christopher Stone's All British gramophone recital was the best he has given us for a long time. He has so often annoyed me with his terrible selection that, on this occasion, I was agreeably surprised. Two records which pleased me particularly were "Pretty Polly Perkins of Paddington Green" and "The Old Sow." Surely there must be scores of records of this type in the different lists. If only Mr. Stone would get hold of them!

What a magnificent voice Samia Bingham has! She made the "From Revue to Grand Opera, No. 4" turn really high-class. Trevor Jones, on the other hand, was not quite so successful.

He seemed to find it difficult to keep on to his note.

It is no good disguising the fact that the repeat performance by Street Artistes did not compare favourably with the original show. From start to finish it seemed to lack fire. The artistes did not appear to be their natural selves, and the songs were not wisely chosen.

The way the street-organ was managed made me squirm.

"Bill's Grand National" owed much of its success to its topicality, and must have been a consolation to those millions whose names did not appear in the lists of successful Sweep-ticket holders. I was sorry that Bill and his family hailed from Qwdham, for the North Country dialect is, I fancy, exploited rather too much over the wireless. All the same, the play had merit, and one or two incidents, especially the running commentary on the race, were very amusing. Once again, the absence of excessive noise was a pleasing feature of the production.

I was sorry when Mr. John Watt announced the end of his survey of Musical Comedy (1867-1932). The selection of these gems was excellent and, one could sense, considerable care had been taken over the selection. There is no doubt that Olive Groves is unsurpassed in this sort of music. Her voice has quality, is well controlled and, what is equally important, she gets her words over.

The same may be said of George Baker—the baritone in the same programme. His singing was always spirited, his tone good, and although every word he sang was heard distinctly, the quality of the tone was never allowed to suffer. He and Miss Groves make an ideal pair, and any programme in which they appear should be worth listening to.

Though as a rule I dislike the intrusion of a commentator in a programme of light music, I must say I thought Mr. John Watt's remarks on this occasion were an added interest. Perhaps this was because he didn't indulge in airy nothingnesses—he had something to say, and he was slick with it.

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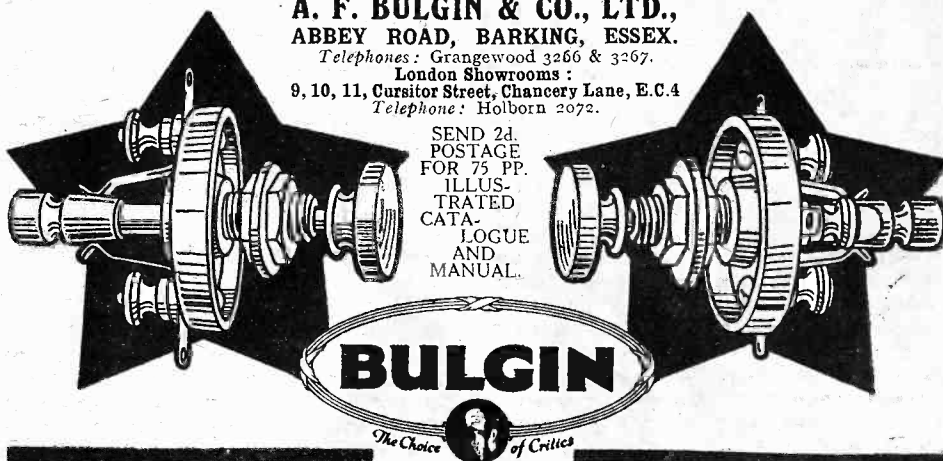
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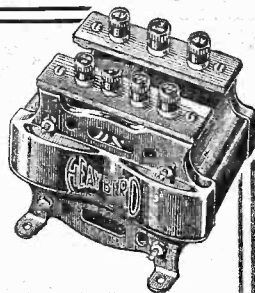
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TECHNICAL NOTES.

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

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

The Metal Rectifier.

THE copper oxide rectifier, the basis of the Westinghouse metal rectifier, which has now achieved such great popularity, has often been said to be nothing more than a modification of the crystal-contact rectifier. Although in one sense this may be true, there is such a difference in the formation of the two devices and in their current-carrying capacities, that they obviously come into two entirely different categories.

As regards the actual secret of their working, if the truth were told probably nobody is absolutely certain of the exact *modus operandi* either of the copper-oxide rectifier or of the crystal detector—certainly the latter.

In view of all this, I was interested in a letter received from the Westinghouse Brake and Saxby Signal Company, which gives an account of an action in the United States Courts for alleged infringement of the original patent on the copper-oxide rectifier. The invention in question is due, as most radio experimenters in this country know, to Dr. L. O. Grondahl, of The Union Switch and Signal Company of Pennsylvania, U.S.A.

The action for alleged infringement was taken by the above-mentioned company, with others, against the Kodel Electrical Manufacturing Company, and both in the Lower Court and in the Appeal Court the plaintiffs were successful, according to the communication mentioned above, and were granted an injunction against the defendants.

Point-Contact Rectification.

The really interesting part of this business, so far as my readers are concerned, is that during these actions a large number of prior publications were cited against the novelty of the invention, and whilst it was admitted that the rectification or detection of small alternating currents by devices involving point-contact phenomena was well known prior to the date of the patent in question, none of these publications disclosed the broad idea of utilising a relatively large area at the internal boundary between a copper plate and a layer of cuprous oxide formed thereon for the rectification of alternating currents, this being the fundamental novelty claimed for Dr. Grondahl's invention.

According to my information from the Westinghouse Company, the Appeal Court confirmed that Dr. Grondahl's patent for the rectification over a large area at the internal boundary between the copper and the copper oxide was valid.

Improving Selectivity.

Selectivity requirements differ a good deal in different parts of the country, as everybody knows. But now, with B.B.C. wave-length changes and so many extra stations on the air, the need for some extra degree of selectivity is continually increasing.

If your set is insufficiently selective, and you wish to sharpen it up without making any structural alterations, a very simple dodge is to use an external tuned circuit, which may be coupled to the existing aerial tuning circuit of the set by means of a capacity coupling.

Capacity Coupled.

The external tuned circuit may consist of, say, a No. 30 or No. 35 plug-in coil—or, if there is a very bad interference, it may even be desirable to go to a No. 50 coil and use tapings—whilst the variable condenser to complete the external tuned circuit should have a maximum value of .0005 microfarad.

The coil of this tuned circuit is, of course, connected between aerial and earth in the usual way and the aerial is then connected to the aerial terminal of the receiver through a small variable condenser.

The capacity of this condenser—that is the *minimum* capacity—should be extremely small; the condenser should be able to reach down at least as far as a minimum of 2 micro-microfarads. This minimum is very important, because if a sufficiently low value of this coupling-condenser capacity cannot be reached, the desired degree of selectivity will not be obtained by means of this device.

A Very Small Condenser.

The neutrodyne type of condenser is suitable for this coupling condenser; but, as a temporary measure, if you do not happen to have a neutrodyne condenser available, or do not wish to procure one, you can make an improvised variable condenser of very low capacity by means of a short length—a few inches—of electric light flex.

The capacity of this length of flex will obviously depend upon the way in which it is twisted together and can be decreased by untwisting the flex to some extent. Of course, the two free ends of the wire should be separated from one another and bound up with insulating tape.

Operating the Circuits.

When this external tuned circuit is fixed up, as described above, it is quite a simple matter to operate it along with the ordinary tuning controls of the set. To start with, the variable condenser in the external tuned circuit should be put to about its middle position.

Then the ordinary tuning of the receiver should be operated for the desired station. When this is received there will probably be local interference, which is largely got rid of by adjusting the condenser of the external circuit.

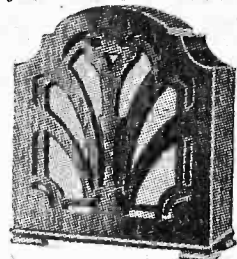
Usually this will have the effect of bringing up the strength of the desired station, and more or less eliminating the undesired one. If the effect is not complete, however, the capacity of the small coupling condenser should be still further reduced.

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

If you are using the twisted-wire arrangement mentioned above, then just separate another turn or two of the flex.

Naturally the alteration of the coupling condenser will upset the other two tuned circuits, so that they will then have to be readjusted, but after a little practice you will find that this additional circuit is often very effective in giving just the extra selectivity which you require.

Balanced Armature Loudspeakers.

I was talking to a musical friend recently, who also takes a great interest in the technical side of radio, about the balanced-armature type of loudspeaker, and he said that, although he thought this type of speaker had been very much improved of late, at the same time it was a little bit apt to interfere with perfect musical reproduction.

I wonder how many of you have the same opinion of the balanced-armature unit? Apparently it is a question of the inertia of the moving system which, owing to its relatively large mass, does not so easily follow very sudden or rapid changes in the type of motion intended to be imparted to it.

Personally, I do not altogether share this view: I think that the balanced-armature unit has considerable possibilities which have not yet by any means been fully explored, and I think that during the next year or two we shall find manufacturers giving a good deal more attention to this type of unit than they have done hitherto.

I should be very interested, however, to have the views of readers on the question of the efficiency of the balanced-armature type of unit as compared with that of other units, such as the moving coil.

Special Transformers.

Now that low-frequency transformers with cores made of "special alloys" are becoming so popular, it is rather important to bear in mind that these are inclined to have their own special peculiarities. One of these is that, with the high magnetic permeability of the metal core, the transformer generally gives its best performance when there is only a very small D.C. current in the primary.

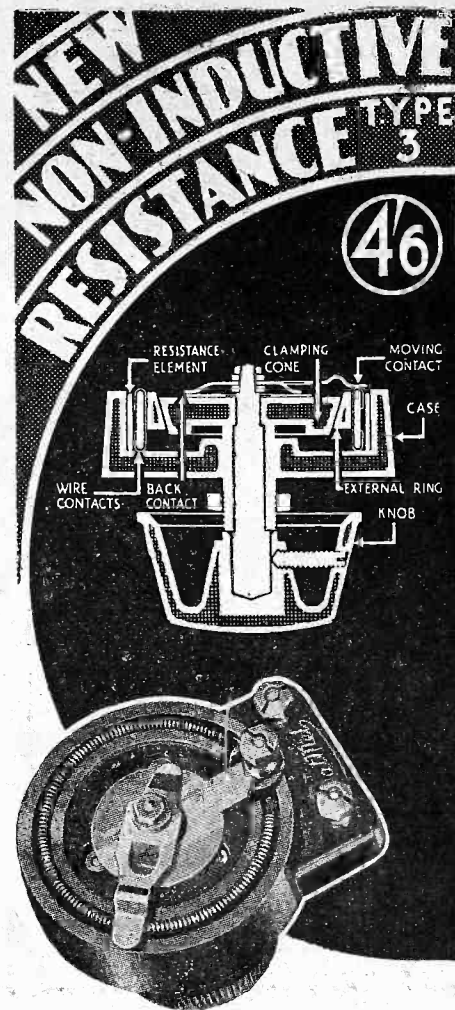
If you use it in conditions where the primary current is too large, this will probably reduce the effective inductance so that the performance of the instrument will not be so good. Of course, if the transformer is specially made to carry a current of several milliamps, then that is all right, but many of them are not designed to carry more than one or two milliamps in the primary.

Such a transformer would not give its best if it were used, for instance, with a detector valve passing, say, 4 or 5 milliamps through the transformer.

Resistance Feed.

In this case, what you can do is to use a resistance feed or choke feed to the anode of the valve. If you use the resistance-feed method, you want to take care that the resistance does not cut down the voltage actually delivered to the anode of the valve too much. Either the resistance must not be too high or, if the resistance is fairly high, a correspondingly higher H.T. voltage must

(Continued on next page.)



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TECHNICAL NOTES

(Continued from previous page.)

be used to make up for the voltage which has been dropped in the resistance.

Choke Feed.

With the choke-feed arrangement there should be a very small drop in the voltage, and this method generally gives quite good results. The proper reproduction of the bass audio frequencies depends to quite an extent upon the relative values of the choke and the coupling condenser.

Talking about using a choke with a detector valve, reminds me of another use for a choke in this connection—although, of course, in a somewhat different way. If you are troubled by low-frequency noise or hum in a mains-driven set, this can often be cured by the use of a choke in the anode circuit of the detector, the choke being shunted by means of a condenser.

The detector, as you know, is really the tender spot of the whole of the circuit, so far as amplification is concerned, and trouble due to extraneous noises is felt more sensitively at this point than at any other. Consequently, we always look first to the detector position for eliminating anything of this kind.

The really professional way of overcoming hum and suchlike extraneous noises is to decouple the valves by means of high resistances. But if you do not wish to go to that length you may, as I say, be able to accomplish what you want by means of the choke and condenser already mentioned. Incidentally, it is not necessary to buy a choke specially for the purpose—at any rate not until you have tried out the method, as you can use one of the windings of a spare L.F. transformer for the purpose.

Interaction and Instability.

Talking about decoupling, it is rather curious to think that, not so very many years ago, we used to talk quite a lot about the interaction between low-frequency transformers and the H.F. coils in the set.

The instability which caused trouble was generally attributed to this interaction, but in point of fact, as we now know, a good deal of it is due to the coupling which arises from the resistance of the H.T. battery common to the various circuits. Decoupling consists essentially in keeping out the high-frequency currents from the battery by putting a suitable resistance in each of the positive high-tension leads, so obstructing oscillations which otherwise tend to be set up, and then providing a low-resistance path to earth by means of a fairly large capacity condenser.

Adding Decouplers.

I have several times examined sets which were not decoupled at all, or in which the

decoupling was applied to some of the valves and not to others, and have found that by introducing decoupling, or adding decoupling in the places it was absent, the reproduction was very greatly improved, as well as the stability and ease of operation.

A useful tip to bear in mind in this connection is that if you have not room in an existing layout for ordinary cartridge resistances, you can get just as good results by using spaghetti resistances instead.

Anode-Bend Peculiarities.

A good many experimenters favour the anode-bend method of rectification because of the fact that tuning tends to be sharper than with the grid-leak method, that is to say, if the circuit remains stable. On the other hand, I daresay you have found that there is a greater tendency to instability with the anode-bend method than with the grid-leak system.

Often you will find that, on changing over from the grid-leak to the anode-bend system, the set will go into oscillation without reaction being used. The reason for this is that the grid-leak detector acts as a load on the circuit, or as a resistance, if you like, and so broadens the tuning.

Too Lively!

A circuit which is too lively, say one with a screen-grid stage, may be toned down and stabilised by means of a resistance connected across one of the tuning condensers. This resistance will have the effect of broadening the tuning.

As regards the question of the relative merits of the grid leak and anode bend, many people, of course, consider that the grid leak gives better quality, whereas on the other hand some people prefer the extra liveliness and sharpness of the anode bend arrangement and consider that any possible slight sacrifices in quality is more than counterbalanced by its advantages.

A Curious Fault.

Talking about the anode-bend detector, by the way, I came across a rather curious thing, the other day. I was examining a set in which a resistance had been used to cut down the filament voltage to the detector, this being of the anode-bend variety and with a suitable negative bias.

The set was not working properly, and it turned out that the filament resistance was in series with the negative end of the filament, whereas the grid bias battery was, of course, between the L.T. negative and the coil. The effect of this was that the grid bias actually applied to the valve was equal to the voltage of the grid-bias battery plus the voltage dropped in the filament resistance.

When the filament resistance was changed over to the positive end of the filament the set functioned perfectly.

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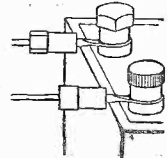
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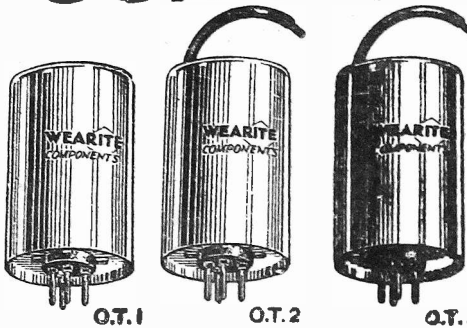


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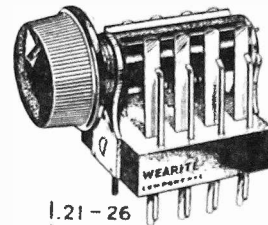
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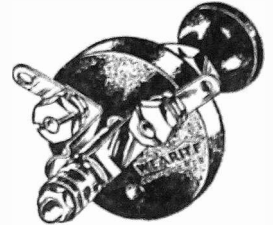
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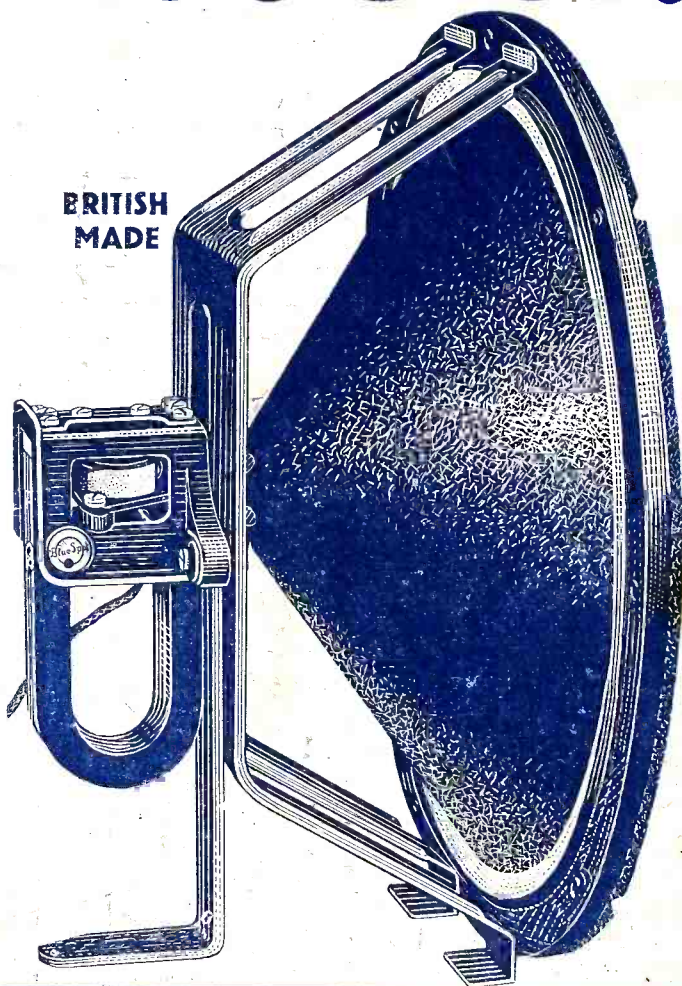
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