POPULAR WIRELESS, April 2nd, 1932. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

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

Popular Wireless

Every Thursday PRICE 3d.

No. 513. Vol. XXI. INCORPORATING "WIRELESS" April 2nd, 1932.

What can I expect from His Master's Voice Radio?

Let the press experts tell you—Read below!

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. Kônigswusterhausen, 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."

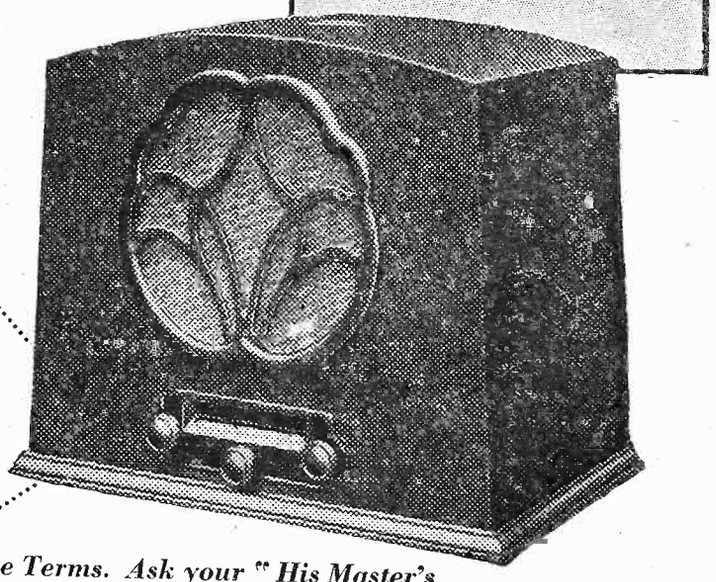
Wireless World adds, "Practically every modern feature likely to enhance the performance of the set and simplify its operation has been incorporated."

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."

THE SET THE EXPERTS RECOMMEND



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.*

A.C. or D.C. **20** GNS.

Price does not apply in Irish Free State.

COUPON

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 .....

P.W.1. .....

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

His Master's Voice

MODEL 435. "TRUE TO LIFE"

Popular Wireless

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SWEEP 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.

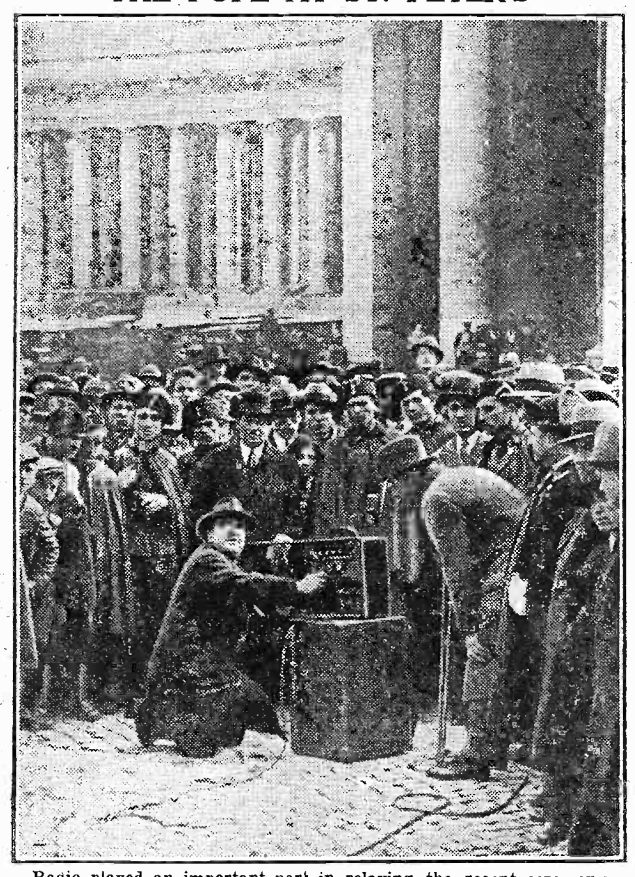
CONGRATULATIONS to Mr. T. L. Eckersley, brother of Capt. P. P. E., on his success in having a paper accepted for publication by the Royal Society. The paper, entitled "Examples of Phase Integral Methods Applied to Electromagnetic Wave Transmission," is a sequel to one already published by the Royal Society, "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 Seneca's saying, "Courage leads to Heaven; fear, to death."

THE POPE AT ST. PETER'S



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.

"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 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 mellower, 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 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.)

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 tobacconist, 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 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.

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.

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.

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.

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.

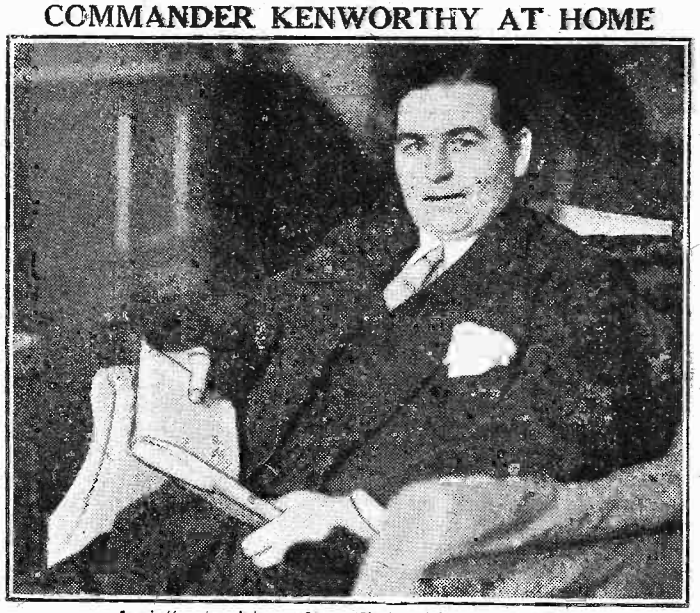
In Armada Days.

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-establishment 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 our 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 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.

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 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.

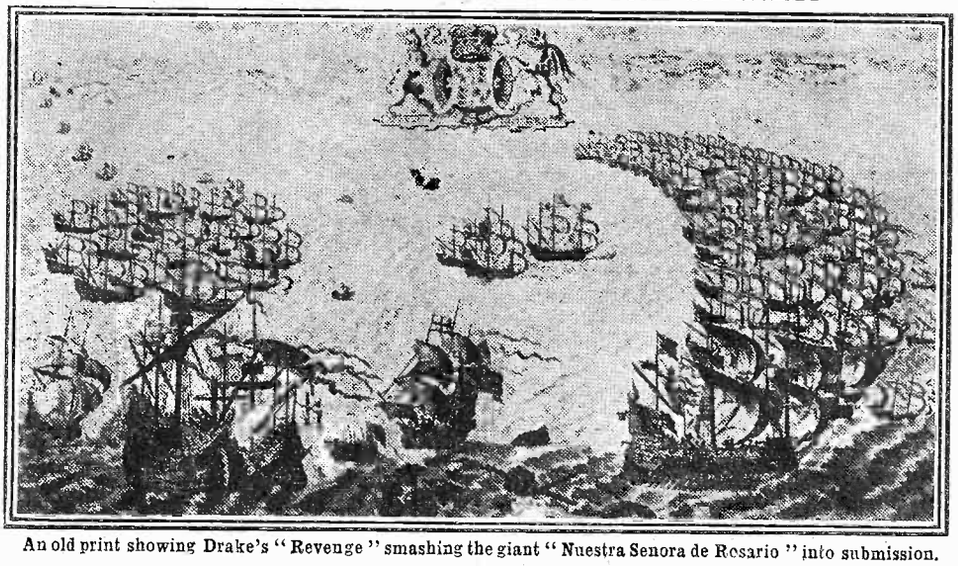
Then the gale sprang up of which, again owing to the lack of wireless, the Spaniards had no previous warning. Without better means of communication it was impossible to rally their scattered ships.

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, 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.

A SMASHING DEFEAT FOR THE SPANISH



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

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."

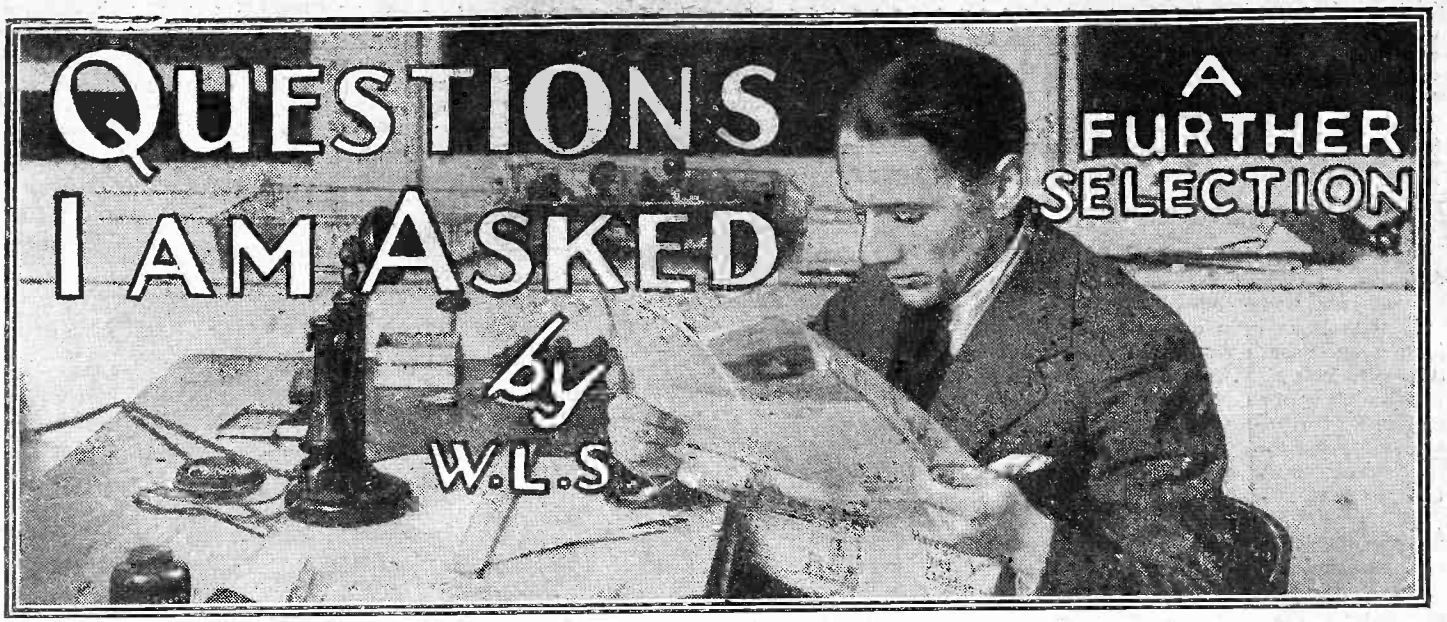
Of course, the game was up right away, for I at once suspected that the detector valve was a particularly microphonic specimen. Well, I was not quite right, but eventually I traced it to a "dud" anti-microphonic valve holder, which was certainly not anti-microphonic, and probably never had been!

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!



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 untuned 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 headphone 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 *any*body 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 C T 1 A A 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.

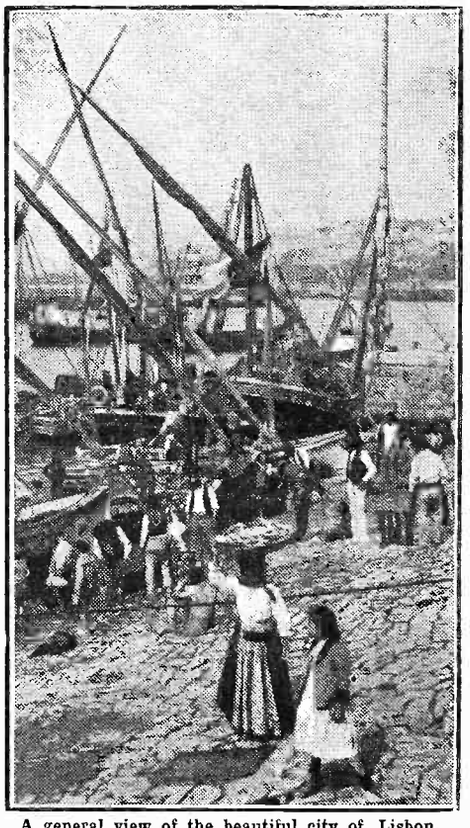
Like The Local!

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 C T 1 A A, 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 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."

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 C T 1 A A.

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 C T 1 A A, 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 Toc; it used to be—it's C T 1 A A 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. Kolkrorst, 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.

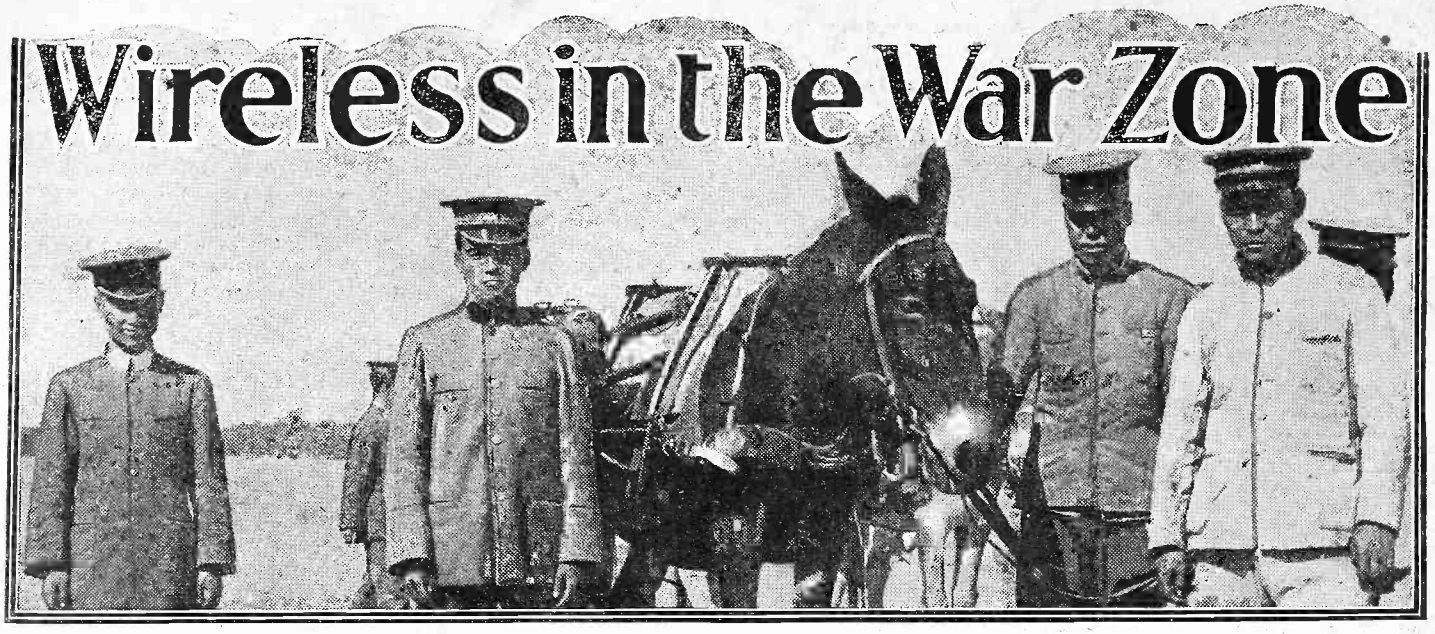
He expounded his reasons for thinking that the English understand the feelings of the Portuguese better than any other nation in the world, and he concluded by saying that he hoped that this spirit of close relationship might ultimately lead us to the great Commonwealth of Nations.

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 pianoforte music of the Sunny South, followed,

(*Continued on page* 108.)

Wireless in the War Zone



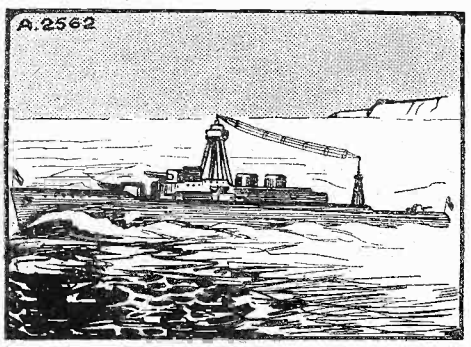
Recent happenings in the Far East have done much to prove the value of radio in the field. In fact, present-day warfare depends on this form of communication to a tremendous extent, tanks, aircraft and even infantry units being equipped. You should read this article on an all-important subject.

By Our Special Correspondent.

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

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.

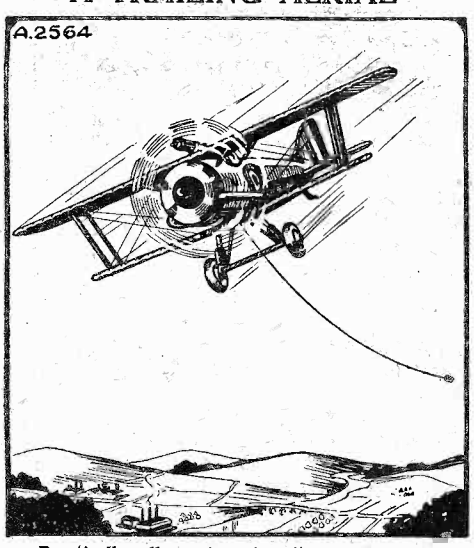
The Chinese, of course, are not so forward despite the interesting fact that they had a highly developed civilisation thousands of years ago, and used gunpowder and an early form of motor-car when our ancestors were running about in tiger skins. It is remarkable that they did not hit upon wireless, for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

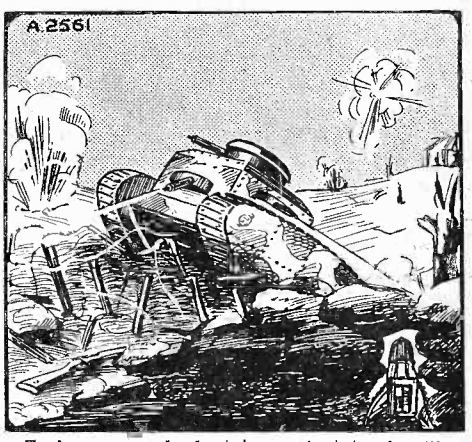
Since the Great War enormous strides have been made in wireless as a weapon of war. Although radio telephony was used fairly extensively towards the end of the conflict, it was only in its infancy stage; and the valve, which had been introduced in 1915 (many will remember the early valve, the product 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.

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.

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

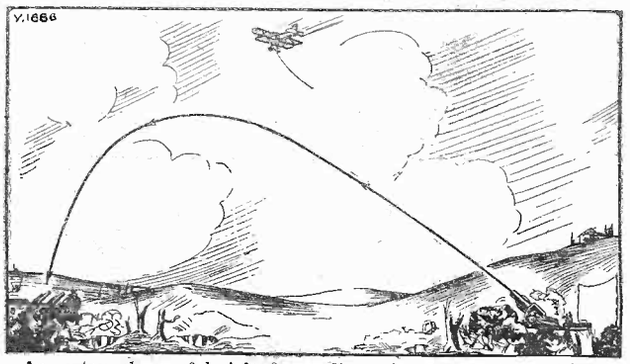
Some ultra-short waves have an absolute maximum range of a few miles, which can be adjusted to almost fixed limits, and these, together with the many more or less secret devices which can be incorporated in the wireless apparatus, and which make it impossible for any but the persons concerned to understand what is being said, 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 wirelesses to the gunners and tells them if their shells are hitting the mark, and gives them information that will assist in finding the range.

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.

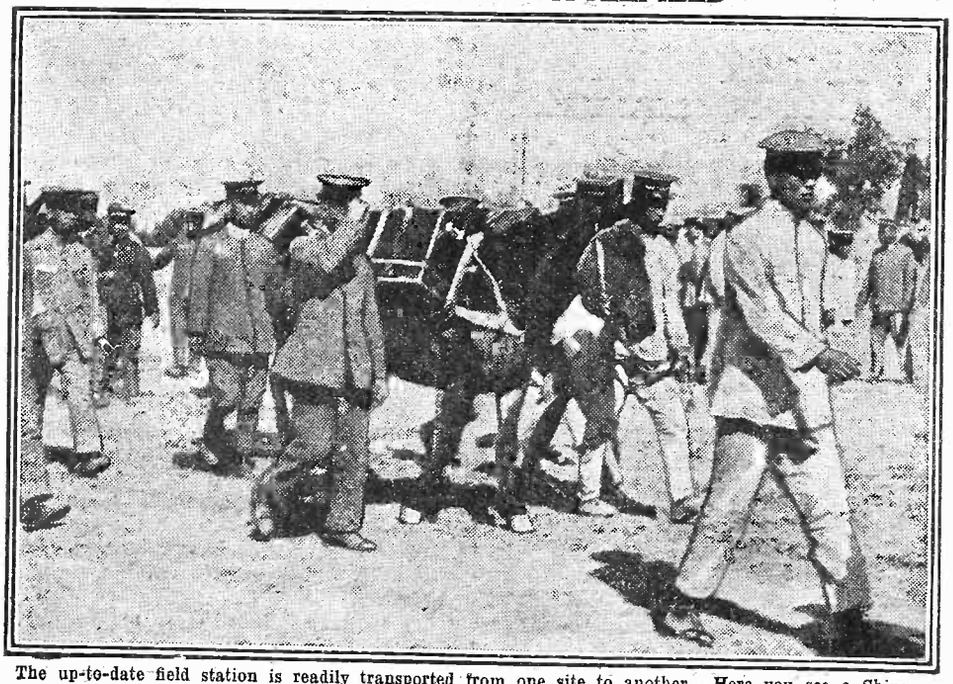
Had the Chino-Japanese war lasted any appreciable length of time we might have seen wireless-controlled tanks, aircraft, aerial torpedoes and battleships in action. The wireless control of machinery from a distance is now a practical possibility, and aircraft carrying large stores of bombs can be made 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 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.

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.

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 Extenser. I have a Cyldon Extenser 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.

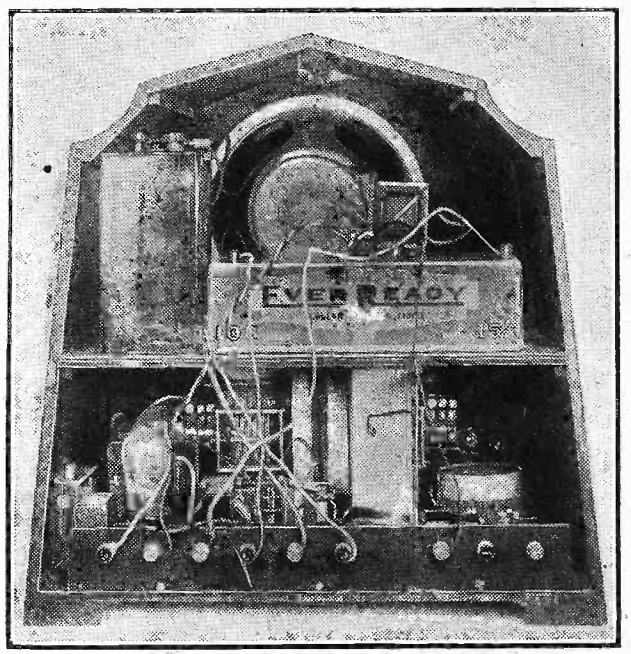
Potentiometer Value for Last Valve.

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 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 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.

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.

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 mfds. 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.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

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.

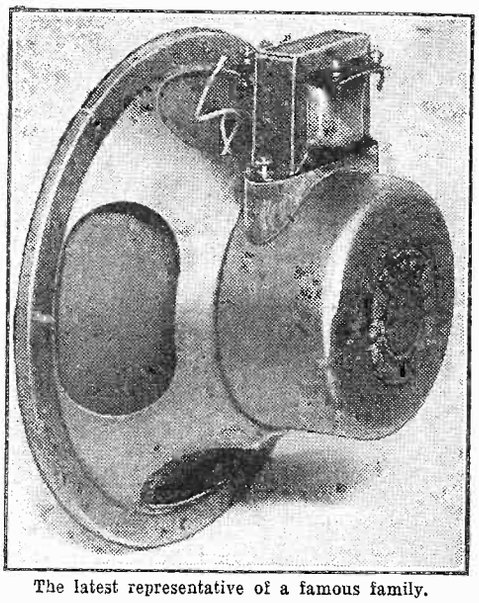
All readers who are interested in loudspeaker progress should make a point of asking their local dealers to demonstrate this Epoch J.1.

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.

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!

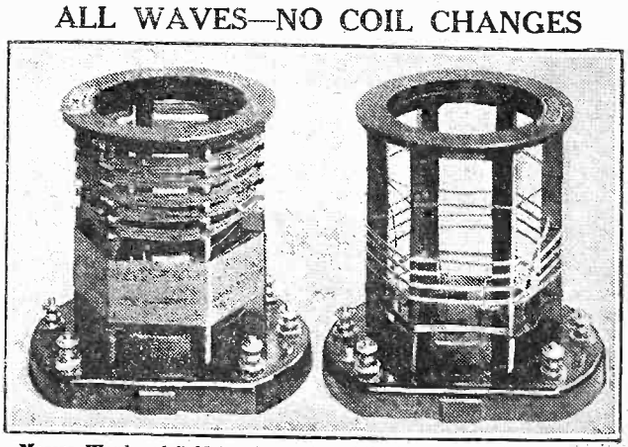
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

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.

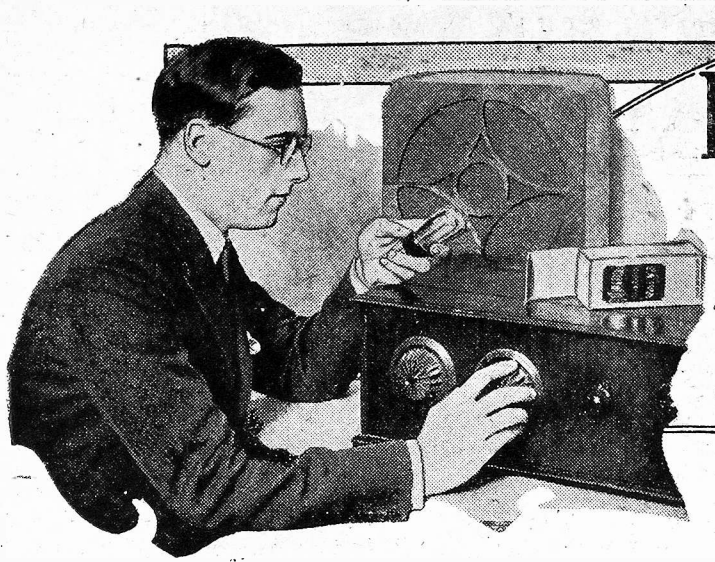
And so with the "Cosmic," for, as you all now know, this received unprecedented trade backing. Ward & Goldstone represented the North in the making of the special coils, and who could have done it better? Who *is* doing it better?

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, handmade 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

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

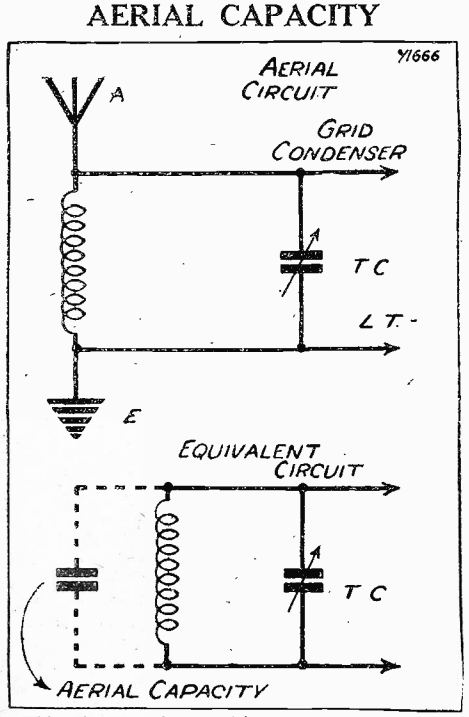
By T. P. BLYTHMAN, B.Sc.

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



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

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

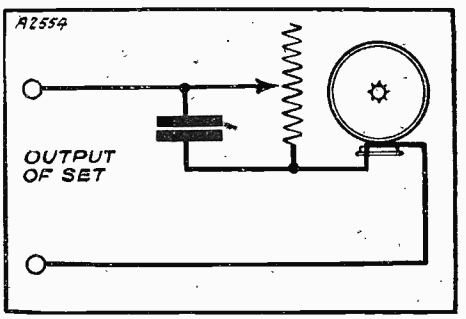
SELECTIVITY WITH QUALITY

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.

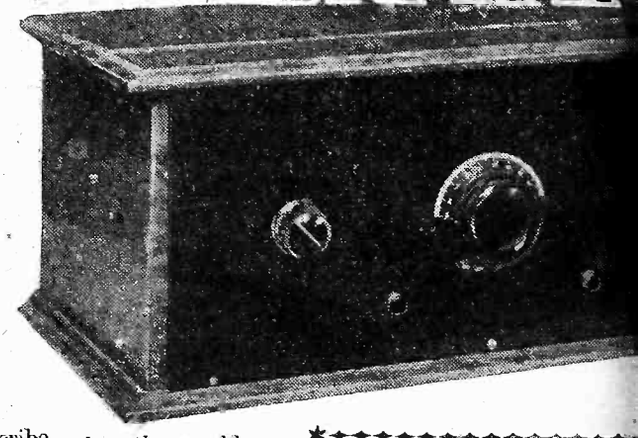
The arrangement which I have had in use for some time is explained by the diagram.

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. PEGRUM.

"MODERATIN



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

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

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 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.

By G. V. DOWD

In ninety-nine cases out waste in the aerial, in ord can be obtained. But if yo to recapture most of the command even better st the result is really astonish article, for this gives you th scheme, as well as detail

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 turning 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.

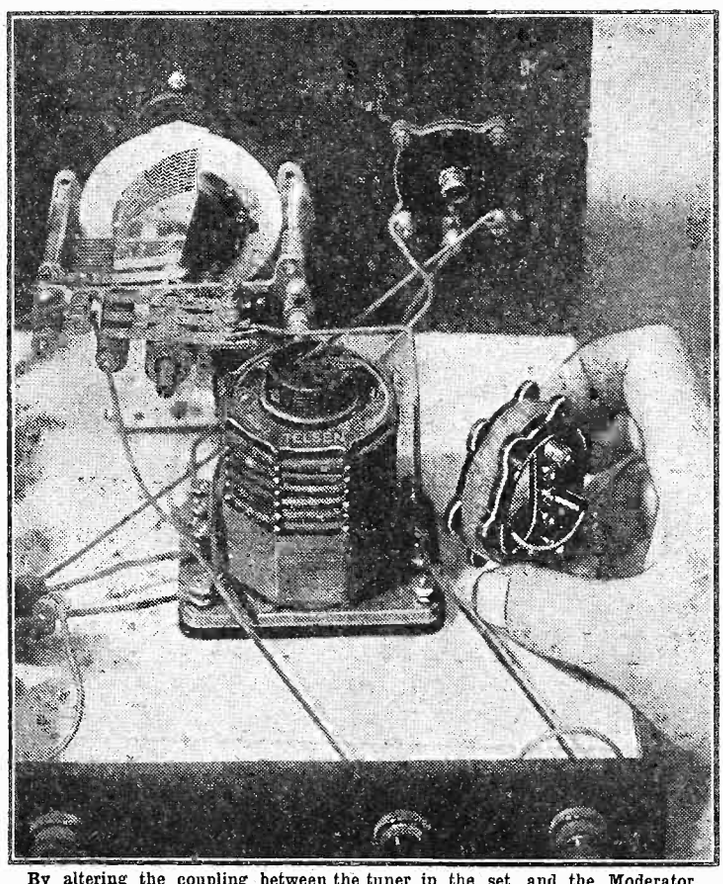
One could have shrugged one's shoulders and philosophically decided that that was very much that, and pursued a policy of making constructors pay for selectivity-plus-power in cash or extra tuning dials.

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.

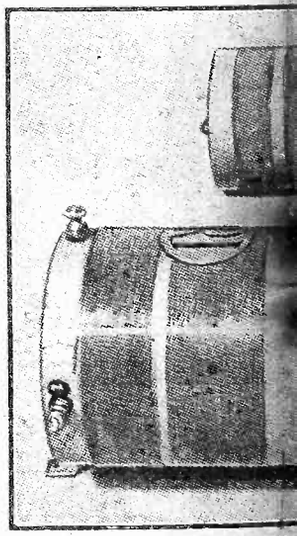
The first variable condenser would be

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.

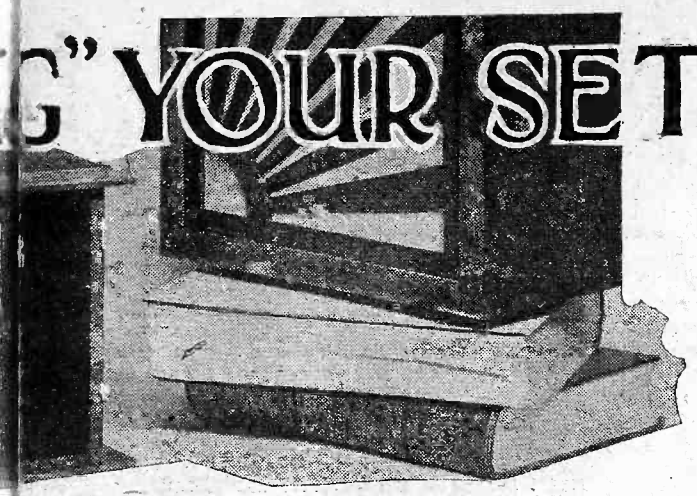
AN INFINITELY V



With a Solenoid coil the positio and underneath you see

HOW TO 'HOT UP' *YOU*

G" YOUR SET



Associate I.E.E.

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

AN IT A TOR

ALLY

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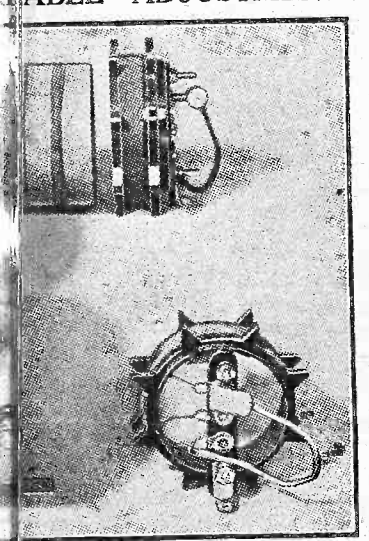
ABLE ADJUSTMENT



greatest power is shown at the top, osition for greatest selectivity.

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 away 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 farcical, 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 those 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

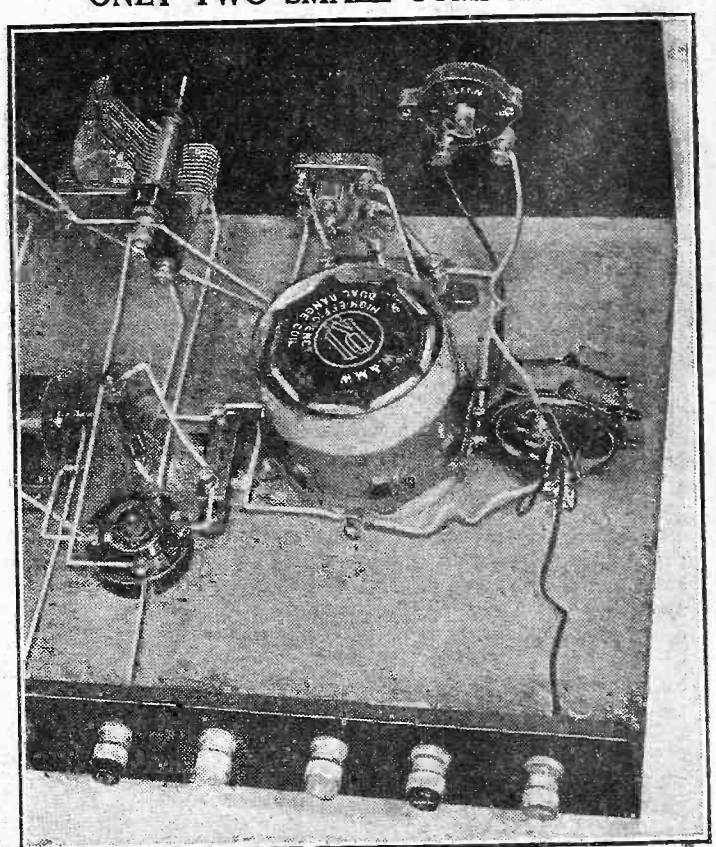
1. **ADDS POWER TO A RECEIVER BY CONSERVING AERIAL ENERGY, INSTEAD OF ALLOWING SOME OF IT TO RUN TO WASTE THROUGH APERIODICITY.**
2. **GIVES YOU PRACTICALLY ANY DEGREE OF SELECTIVITY YOU REQUIRE.**

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.

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.

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 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 "Radiotorial" 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 "Radiotorial" columns for further general notes on adaptability.

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 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.

The TWO BEST SETS of the SEASON

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KIT "A" Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffilinx for easy non-soldering wiring and free blue print. **89/6**

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APPROVED LIST

		s.	d.
1	Ebonite Panel, 12" × 7", drilled to specification	4	0
1	Plywood Baseboard, 14" × 10"	1	0
1	Ebonite Terminal Strip, 14" × 2"	1	0
2	L.T. Switches	1	8
1	ReadiRad .00075 Moderator Condenser	3	6
1	Duotune Extenser	15	6
1	Slow-Motion Disc Drive for above	3	0
1	ReadiRad .0003 Extended Slow-Motion Reaction Condenser with Bracket	7	0
3	Valve Holders	1	6
1	R.I. "Cosmic" Dual Coil Unit	12	6
1	ReadiRad Moderator Coil	2	6
1	T.C.C. .001 Fixed Condenser, Type "S"	1	6
1	ReadiRad Standard H.F. Choke	4	6
1	Lewcos 100,000-ohms Spaghetti Resistance	1	6
1	ReadiRad Radiogram Switch	2	9
1	T.C.C. .0003 Fixed Condenser, Type "S"	1	3
1	ReadiRad 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
1	Grid Leak, .5 megohm, and Holder	1	4
9	Belling-Lee Terminals, Type "R"	2	3
1	Packet of Jiffilinx for wiring	2	6
3	Belling-Lee Wander Plugs		6
	Flex, screws, etc.	1	2
		£4	**9** **6**

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

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

.....

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

Name.....

Address.....

..... P.W. 2/4/32

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

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

.....

for which I enclose first deposit of £.....

Name.....

Address.....

P.W. 2/4/32 .....

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 L.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 tappings 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 tappings. 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.

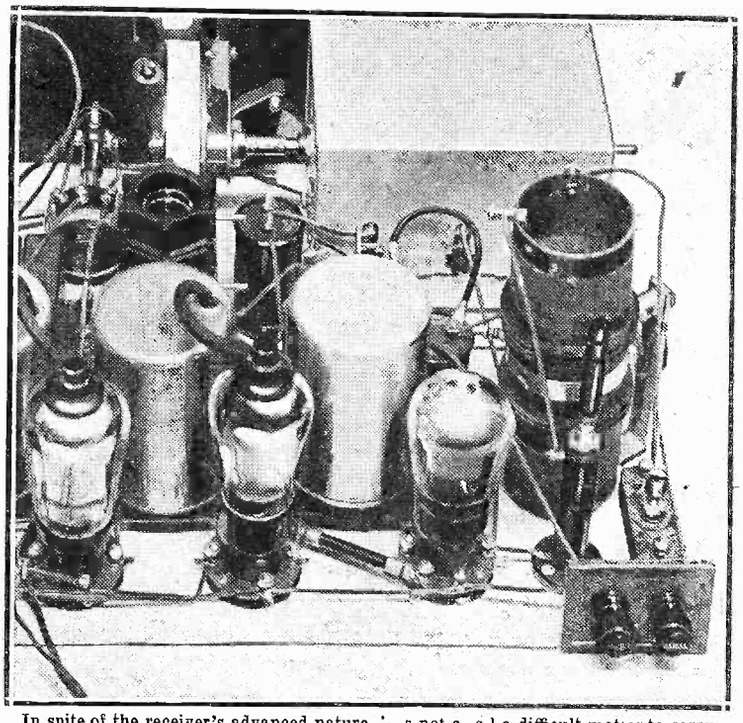
(2). Make certain the ganged wave-band switches are over to medium waves (long-wave windings short-circuited).

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

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.

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.

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.

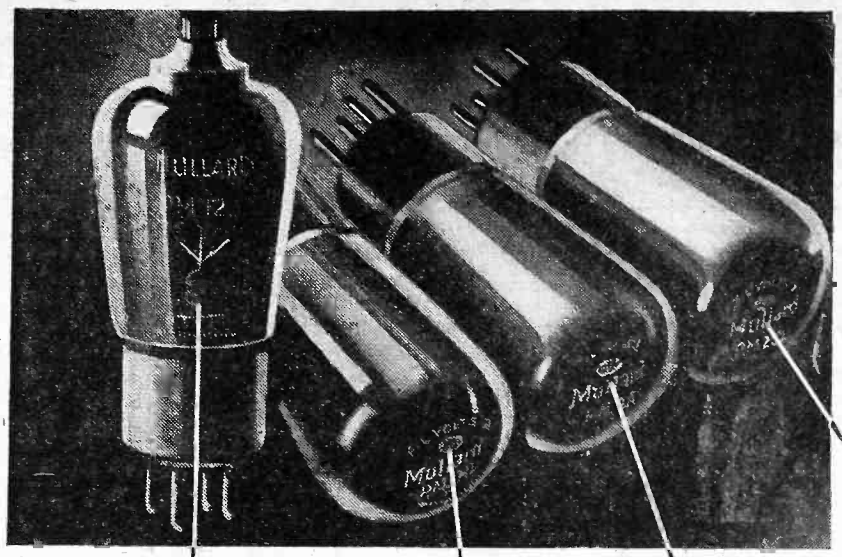
The Long-Wave Settings.

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.



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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.

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, Tiflis. Oslo is actually sandwiched between Popoff and Tiflis with the 100-kilowatt Leningrad working only 53 metres (15 kc.) below the wave-length of Tiflis.

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.

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.

But this is just what does *not* happen on the majority of nights. On Monday, for instance, you may find Budapest weak, Vienna very strong and Munich fair.

On the next night it may be that Budapest requires the volume control, whilst Vienna 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 (Rosenhuegel), 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.

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 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 1 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.

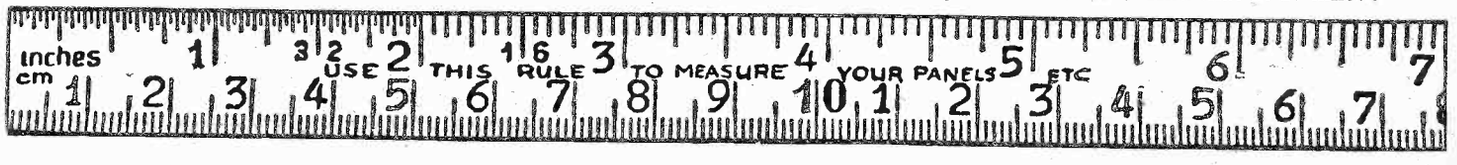
I thought Captain "P. P. E.'s" remarks on the "romance value" of short waves were very much to the point, and I thought he came over particularly well for the first half of his talk, after which a little fading-distortion set in again.

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!



CHARGING FROM D.C. MAINS

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.

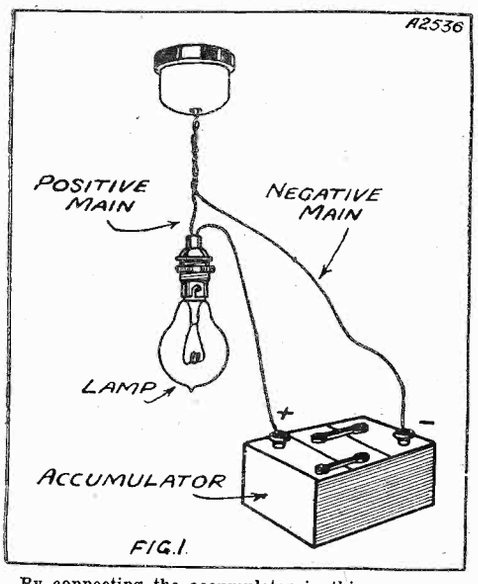
They can be used for charging L.T. and H.T. accumulators with the aid of comparatively simple apparatus. A.C. is very useful, but for charging purposes D.C. mains want some beating.

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

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?"

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.

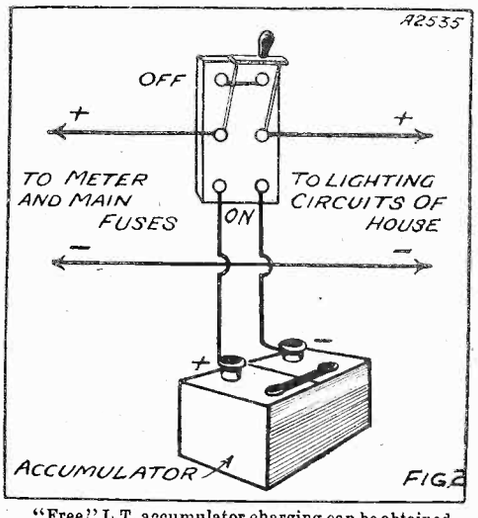
When you have decided what resistance you require for any particular case it will be necessary to find a lamp of the right size. Well, here is a list that will help you considerably:

Size of lamp in watts.	Resistance of 100-volt lamp.	Resistance of 200-volt lamp.	Resistance of 250-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.

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

QUESTIONS AND ANSWERS

CUTTING DOWN THE VOLTAGE.

W. J. (Nr. Leamington).—"A neighbour of mine who is expecting to be away on business for about six weeks has offered to lend me his accumulator to run a second set for short-wave work while he is absent. The idea is that I shall keep the accumulator charged during his absence, and use it as much as I like

"My trouble is that the only valve I have for the short-wave set I hope to get going is a 2-volter, while his accumulator is a 6-volter. And I do not wish to tap off part of it as I understand this would give uneven use.

"The whole idea is that I keep it in condition for him, so I want to know the correct resistance to use to break down the 6 into 2 volts. How is this calculated?"

The number of ohms resistance required in the filament circuit to run a 2-volt valve from a 6-volt accumulator can easily be calculated by a slight modification of the Ohms Law formula. Ohms Law says that if the pressure (in volts) is divided by the current (in amps), the answer will be the resistance (in Ohms); in other words, $R = \frac{V}{I}$.

For our purpose we can retain that equation but modify the meaning of the symbols a little.

We can call I the current of the 2-volt valve. And if we subtract the voltage at which that valve should operate from the voltage of the accumulator and call this figure V, then the required resistance for that valve in ohms will be equivalent to V divided by I. Knowing the voltage difference and the current, you should simply divide the latter into the former and thus obtain the required resistance.

You will see that the current taken by this 2-volt valve is an important factor in getting the figure you want. Suppose, for instance, you are going to use a 2-volt valve rated at ·1 ampere filament currant.

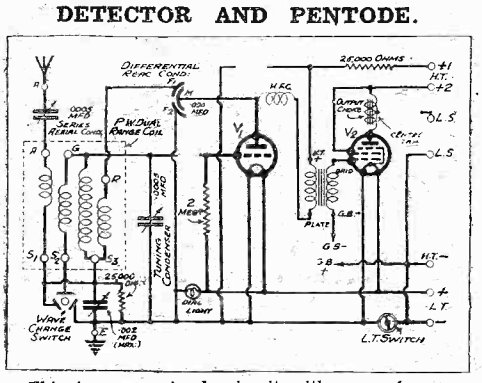
That valve should take ·1 ampere when used with a 2-volt accumulator. What resistance (R) will be necessary if a 6-volt accumulator is used?

Let us work out the example. From the formula given above it will be seen that to find R it is necessary to divide C into V.

In our modification of the formula we explained that C will be equal to ·1 ampere, and V will be the difference between 6 and 2 volts, namely 4 volts.

Then it will be seen that ·1 goes into 4 volts exactly 40 times, so that the filament resistance required in such circumstances would be 40 ohms. Other examples may be worked out in the same way provided you know the voltage of the supply; the voltage at which the valve in question is supposed to work, and the exact filament current it takes at that voltage. But do not forget that V is not the 6-volt accumulator nor the 2-volt valve, but is the *difference* between these two, divided by the number of *amperes* to get the required number of ohms.

MISSING LINKS, No. 31
DETECTOR AND PENTODE.



This is a very simple circuit with wave-change unit, and three of its "components" have purposely been omitted. Can you fill them in, with suitable values?

LOUDSPEAKER CONNECTIONS.

W. J. F. (London, N.).—"Being in the export line I am occasionally asked by friends to purchase goods for them at wholesale prices, and, although it is stretching a point, I have frequently done this. As it is easier to get several of a commodity rather than one I generally manage to wait until two or three people want the same kind of thing before I oblige friends in this way, and thus it was that I came to supply two loudspeakers about three years ago to two different acquaintances.

"I have just discovered that whereas one of these loudspeakers is as good now as the day it was purchased, the other which was used on a very similar sort of set and had about as much work to do, became very weak and finally had to be replaced about twelve months ago. When I said I was surprised that one had lasted so much longer than the other I was told that the explanation was that one of them (the one which had packed up), had done so because it was "connected the wrong way round."

"Until then I did not know there was a right and a wrong way of connecting a loudspeaker, and should be glad of some information on this point as I did not like to show my ignorance by inquiring at the time."

In a great many cases especially with the older type of loudspeaker, you will find that one of the terminals is marked with a + sign and the other with a − sign; or else that one terminal is coloured red and the other black, or that there is some other means provided for distinguishing one from the other. In some cases, if the actual terminals are out of sight you will find that the two ends of the connecting cord are distinguished, possibly one being coloured red by having a red thread running through it, for purposes of identification.

Similarly, unless your set employs some kind of output scheme, one of its loudspeaker terminals should be marked with a + sign and the other should have a − sign. (The − one is that which is connected internally to the plate of the last valve.)

Under such conditions the loudspeaker leads should be connected so that the red one, or whichever is marked with a +, is joined to the + loudspeaker terminal on the set. And, of course, the − loudspeaker lead should go to the − terminal on the set.

Then if the loudspeaker employs some form of permanent magnet the current flowing through the winding will be assisting the magnetism inside it. If the leads are reversed the current is continually at variance with the permanent magnet inside the speaker and in due time this may suffer to such an extent that the instrument is said to be "de-magnetised."

The results will fall off, and the speaker will become relatively insensitive, so it is quite possible that this is what happened in the case you mention.

DAVENTRY MOVING.

H. S. P. (Northampton).—"Is it true that the Daventry stations are moving to Droitwich?"

Yes. The B.B.C. has decided to move both 5 X X and the Midland Regional to a site near Droitwich.

The Daventry site will continue to be occupied, it having been decided to erect the new Empire Short-wave Station there. Details of the arrangements will be reported in "P.W." so watch "The Mirror of the B.B.C." and other "P.W." pages for exclusive further news and developments.

EXTENSER CONNECTIONS IN THE "COSMIC" THREE.

J. K. T. (Chorlton-cum-Hardy, Manchester).—"I am very 'raw' and cannot follow theoretical circuits, so am compelled to rely upon your wiring instructions on page 1280 of February 13th issue of POPULAR WIRELESS, and on the accompanying blue print of connections.

(*Continued on next page.*)

"P.W." PANEL, No. 65. USING H.T. BATTERIES.

Batteries should not be stood near hot-water pipes, near fires, in the sun, or in other warm places.

* * *

All the cells in an H.T. battery are in series, so when one is faulty it affects the whole battery.

* * *

If one section of the battery—say between negative and 9 volts—becomes faulty, it can be cut out of circuit by advancing the negative lead from the — socket to one higher than the faulty cell.

* * *

If the fault is at the positive end the positive maximum may be lowered to cut out the faulty cell.

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 quoit.

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 quoit, 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.

"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 winding.

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

"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!

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 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.

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.

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.

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?"

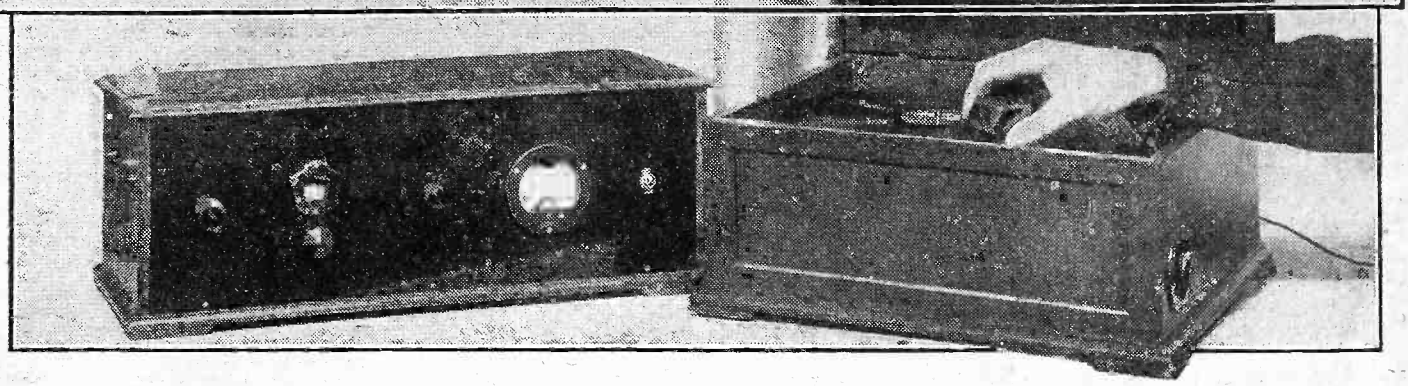
The agriculturist may be inclined to regard these talks as his own, but most of us are alive to the importance of a proper study of the needs of rural populations, tariffs for agriculture, and the distribution and the marketing of farm produce.

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



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

By K. D. ROGERS.

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, even 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 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		
Ginchy Road	Peter Dawson	H.M.V. B4089
Home	Gracie Fields	H.M.V. B4101
Trees	Derek Oldham	H.M.V. B4091
ORCHESTRAL		
Old Vienna	De Groot	H.M.V. B4092
Moon		
Savoy Welsh Medley	New Mayfair	H.M.V. B4023
DANCE		
Sleep on	Ambrose	H.M.V. B6142
Goopy Geer	,,	H.M.V. B6143
Dancing in the Dark	,,	H.M.V. B6132
Washboards	Washboard Serenaders	H.M.V. B6114
Get Together (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 receptable 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 12.5 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 *not* 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!

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 Owdham, 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.

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 tappings—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.*)

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.)

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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Popular Wireless

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No. 514. Vol. XXI. INCORPORATING "WIRELESS" April 9th, 1932.

THE NEW B.B.C. DANCE ORCHESTRA

A constructively critical contribution from Gambier Parry is an exclusive feature of this week's "P.W."

Also we provide full How-To-Make details of

THE "ECKERSLEY" A.C. TWO

MORE ABOUT THE MODERATOR—By G. V. DOWDING, Associate I.E.E.

HOW WIRELESS WOULD HAVE ALTERED HISTORY

2. THE SPANISH MAIN—By Lieut.-Commander The Right Hon. J. M. KENWORTHY, R.N.

FIRST LIST OF OFFICIAL "P.W." EXHIBITORS

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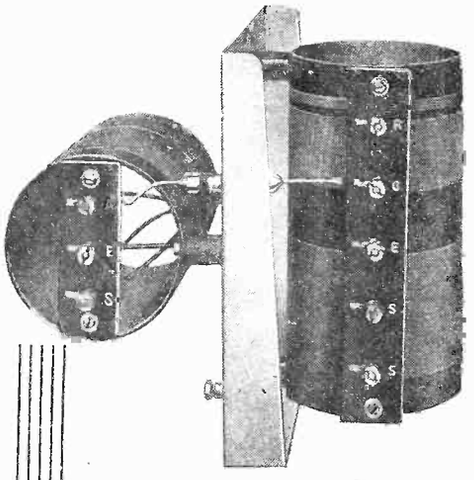
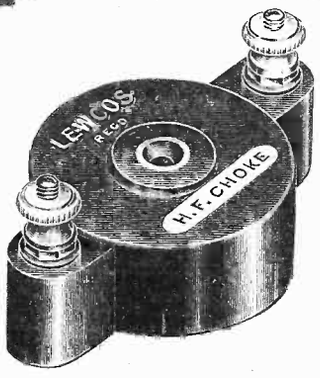


THE LEWCOS "ECKERSLEY" TUNER PRICE 15/6



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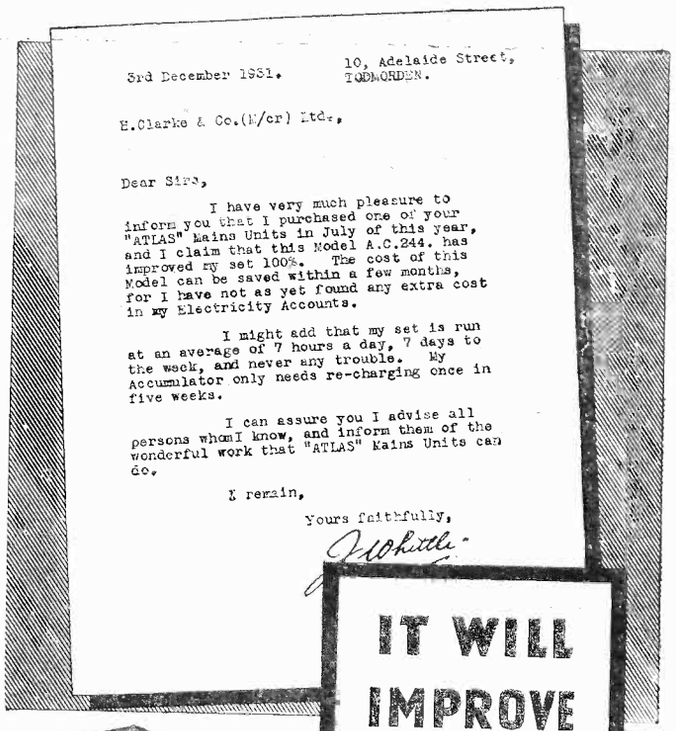

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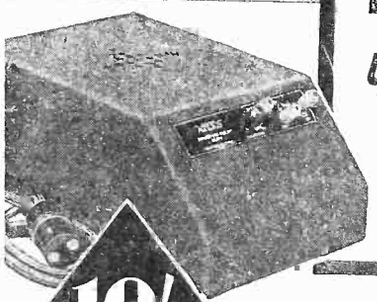

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SPRING THOUGHTS
RADIO & GRAMMY
NO HARM IN TRYING
THE FRETFUL ETHER

RADIO NOTES & NEWS

MY LATEST PLAGUE
S.O.S. CALLS
INTENSIVE PIPS
CANINE STATIC

Thoughts on Spring.

"SUMMER-TIME" will soon be on all our timepieces, and the call of the wild will drown the call of the wireless, at least till about 8 p.m. Soon the sparrows will scuffle about amongst the budding branches and cracks will appear in wireless poles.

Camp sets, hiking, motor-car and portable sets will be renovated. Conscientious men will lower aerials and scrape wires, besides scrubbing insulators. (When will the "pram" set arrive, by the way?) Loud-speakers will soon creep towards windows and doors, and begin the spring *al fresco* contests. But so long as spring really comes—let 'em all come!

Jack's Post-Bag.

JACK PAYNE certainly has reason to be satisfied with the public's response to his and his "boys'" efforts in the world of radio. I learn, for instance, that between the date when his retirement was announced and that of his final broadcast, he received some 20,000 messages from all parts of Europe.

On the day of his last broadcast under B.B.C. auspices he got about 1900 letters and forty parcels of gifts for himself or his wife. Good luck to him—but I can't help wishing that the "boys" came into the picture a little more prominently. I know that my Theory of Stick-wavers is generally unacceptable—but, after all, the "boys" played the stuff, didn't they?

The British Empire Station.

CONSIDERABLE comment has been caused through the action of the B.B.C. in placing its order for the British Empire station with the Standard Telephone Company, most of whose capital is held by the American firm which is the Empire's greatest competitor in the communications business, the International Telegraph and Telephone Corporation, backed by J. P. Morgan & Co.

Hence I feel that I ought to point out that such action connotes neither disregard of British interests by the B.B.C. nor inferiority of the British products.

An Explanation of Interest.

FIRST of all, bear in mind that the station will be built by British labour, anyhow. Then, it should be recognised that, following the general routine of British Government Departments, the B.B.C. avoids dealing exclusively with one supplier in order to obviate a virtual monopoly.

Within a few days of placing the order for the Empire station the B.B.C. gave the Marconi Co. an order for the two Western Regional transmitters; in fact, that Company has had all the B.B.C.'s orders for medium-wave regionals, namely, eight.

Moreover, in such European countries as do not possess big radio companies, Marconi's have built 23 stations out of 37, the odd 14 being divided between other manufacturers.

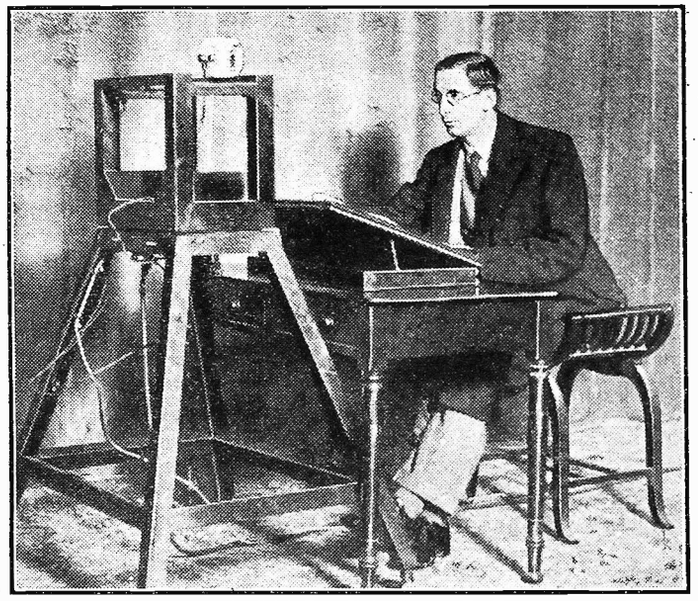
Radio and Grammy Shake Hands.

THE dispute between the German broadcasting company and the gramophone record industry is now reported to be over, and I understand that the radio people will be able to broadcast as many records as they may require. So I should think! There's nothing like radio for selling records! Good records, of course.

The I.S.W.R.L.

PUBLICATION of this League's "News," which was suspended during Nov.-Jan. (inclusive) was resumed in February, and all subscriptions have been carried forward proportionately.

DE VALERA AT THE DUBLIN STATION



The new President of the Irish Free State, Eamon De Valera, is here shown broadcasting a message to the Irish people in America, from the studio of the Dublin Broadcasting Station.

No Harm in Trying.

I SEE a report that a group of financiers is investigating the possibility of establishing a broadcasting station on Brecqhou, one of the Channel Islands, near Sark. This is interesting, but rather melancholy news, for I don't think that there is any chance of the Post Office giving them a licence for the purpose.

The B.B.C. has a monopoly of broadcasting which, I have no doubt, extends to the Channel Islands, and I can hardly believe that it would consent to an invasion of its prerogative by financiers.

Long-Distance Men to Note.

NEXT June, wind, weather, and war permitting, the American Williams-Maris Arctic Expedition will set sail for the Far North, Ellesmere Island, to be precise. Here they hope to set up a radio station and base camp at Fort Conger, from whence they will send daily weather reports by wireless. The scientific director of the expedition will be Dr. H. B. Maris, of the United States Naval Research Laboratory. Signals to hunt for, boys!

The Fretful U.S. Ether.

IF the ether had feelings it would just hate America, because over and above the enormous number of broadcasting and other kinds of radio stations there, the amateur transmitters number no less than

(*Continued on next page.*)

"ARIEL'S" RUNNING COMMENTARY ON RADIO *(Continued)*

22,739, and they are a busy crowd, too. Last year, nearly 4,000 new amateur stations joined the chorus. Well, it keeps thousands of clever young chaps happily, and usefully, employed, and helps to take their minds off Ireland, India, liquor, "petting," gunmen and dollars. So I suppose it's O.K., especially as while they are key-punching and yelling into their "mikes" they can't listen-in to any of these vaudeville programmes.

My Latest Plague.

BEDSTEADS, bees, and bats having quietened down during the winter, it is my sad lot to have been bombarded with epistles from a "boot-clicker" of Northampton all about the, alleged, effect of radio upon his household chronometers.

Nervously clicking my boots, I would advise him that I attribute his inability to leap from slumber at 6.30 a.m. not so much to the malignant effect of broadcasting upon his clocks, watches, hour-glasses, etc., as to the somnolent effect of "clicking," superadded to the well-known punch of Northants ale. Perhaps he will check me up on this and write again—next year!

General Ferrié.

IT is my melancholy duty to record the passing of the French General Ferrié, the father of French army wireless. His name is perhaps more familiar to those of us who were radio men before and during the Great War, for he it was who organised the Eiffel Tower station and service, and was one of the most well-known personalities in European radio.

He was present at Marconi's experiments in communication between Wimercaux and Dover in 1899, and initiated the French military radio service in 1900. He had many decorations, including the Legion of Honour, and was a D.Sc. (Oxford).

B.B.C. "S O S" Calls.

NO doubt you will be interested to learn that of 833 S O S messages broadcast from London during 1931, 335 were successful; about the same as for 1930. That works out to about 40 per cent. Provincial S O S calls produced 23 per cent of successes, whilst such illness calls as were broadcast nationally secured about 52 per cent of successes.

The "Daily Express" tells a pretty story about a kid who was found in the street by a policeman, crying bitterly.

"What's the matter, sonny?"

"I'm missing—and haven't been heard of since!"

"Deferred Television."

RATHER an apt phrase, that, for the "talkies," I think. It was manufactured by A. T. (Staines), who has written at some length on the subject of television. The interesting thing about television, when it comes, will be its operation in the home at the very time when the scenes it depicts are being enacted. However, I am afraid that we shall have to wait a long time for a domestic visual supply of the world's events direct from the "roaring loom of Time." Nevertheless, having been through some of the early struggles of wireless telegraphy, I think we ought to have sympathy with the pioneers of television so long as they stick to hard facts.

"SHORT WAVES"

A number of new yodelling songs were broadcast recently. It is feared that many milkmen listened-in intently.—"Punch."

* * *

HELPFUL HINTS.

It is extremely doubtful if a short high aerial has any real advantage over a high short one.

Distortion caused by a horn type of loud-speaker can be eliminated by stuffing a certain amount of cotton-wool down the funnel. If this is not entirely successful, it may also be inserted in the aural organs.

To ensure your aerial poles "standing" severe gales without "falling," use stay wire that has been manufactured in Scotland. Such wire will never "give."

* * *

A.: "What do you think I shall be allowed on these old valves when I buy new ones?"
B.: "Um—er—I should say you'd be allowed to take them home again."

* * *

In America a man has been playing a saxophone solo at the bottom of a coal mine. On the surface this would appear to be an excellent idea, but unfortunately the thing was broadcast.—"Punch."

* * *

RADIO JERKS.

"Let Beethoven build your muscles," writes a correspondent in "The Daily Mail." "What does it matter if you owe your torso to a rhapsody, and your calves to a cantata? You ought to be proud to go into a gymnasium and demonstrate a good pull-up for 'Carmen.'"

Sweden's Sweet Goodnight!

EVIDENTLY they have been going in for big noise in Sweden—you know! "heard it all over the house"—for there is now a law that no music in a house or flat shall be audible in another after 11 p.m. I don't know whether talks or fat stock prices are tolerated at 11.5 p.m. In order to help on the great silence the Stockholm Broadcasting station now shuts down at the hour mentioned. But could not much the same thing be accomplished merely by reducing power?

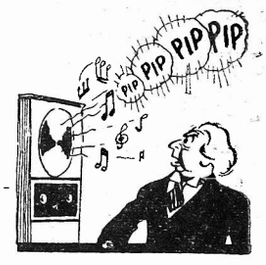
Does the B.B.C. Do It Purposely?

TALKING of reducing power recalls the complaint of C. B. H. (Nuneaton) that as he alleges, the B.B.C. increases its power at times on Sunday in order to try and drown the reception of Radio-Paris's concerts.

I am of the opinion that the B.B.C. wouldn't dream of such tactics, and, anyway, a receiver which will cut out B.B.C. stations in favour of Radio-Paris is easily designed, though what can be done for listeners very near B.B.C. stations depends on circumstances; but, anyhow, if listeners prefer French broadcasting the B.B.C. loses not a penny of revenue for that reason, so why should it worry?

The Intrusive "Pips."

F. G. A. (Watford) is so obliging as to state that if the Greenwich time "pips" irritate me I ought to be in a hospital or lunatic asylum, because my nervous system must be diseased. My objection is not levelled at the "pips" *qua* "pips," but at the unseasonable moments chosen for them wherein to pip.



There is a time to pip and a time to refrain from pipping, and I say that the B.B.C. perpetrates a sin against artistic propriety in allowing its pipping to cut across a piece of music.

F. G. A.'s letter is so impolite that I can only hope that it was prompted by dyspeptic misery rather than by an ungovernable passion for horology. Why doesn't he get a reliable clock, anyway?

Shakespearean Note.

THE B.B.C.'s broadcast version of "Othello," produced in March, was to me a very satisfying piece of work; it kept me from my Sunday tea and sent me flying to the shelves for the play to read again. More, please! This reminds me that the Prince of Wales is to open the Shakespeare Memorial Theatre at Stratford-on-Avon on April 23rd, when his speech will be relayed to "National" listeners. A historic occasion! Make your youngsters hear it, if possible!

Canine Static!

THE latest truthful story going the rounds of the "trade" is that a man who owns a very sensitive portable owns also a dog; this dog, whenever he scratches, causes a discharge of frictional electricity in its coat strong enough to make noises in the loudspeaker.

Solemnly I accept this statement, not a muscle moving on my famous "poker face," and as solemnly recommend that instantly these noises occur the portable owner should stroke a cat in the opposite direction, thus neutralising the dog's charge! Failing this, he should call up a Post Office van and ask it to *detect* the tyke very severely.

ARIEL.

The NEW B.B.C. DANCE ORCHESTRA

By Capt. Gambier-Parry

A GREAT deal has been written in the past few weeks about the departure of Jack Payne and his "boys," and the arrival of Henry Hall in the capacity of director of the B.B.C. Dance Orchestra. Attempts have been made to forecast the style of the new performers and compare it with the old. After the first broadcast of the new band so much space was given to so-called criticisms that one is forced to the conclusion that rumours of bad business in Fleet Street are not without foundation.

Say what you like about Dance Music but you must never forget that to many listeners it is the best feature of the B.B.C. programmes. That is why the big change-over from Jack Payne to Henry Hall is so important, and why this frank and outspoken article on the subject makes such good reading.

Not Meant For Dancing.

Because I am a close student of the technical side of rhythmic music, I have read every word which has been written, in the hope that I might find at least some indication that this kind of musical performance, designed for listening and not for dancing, is coming to be regarded as deserving of specialised and separate study. I have searched in vain for a kindred soul, and find that, though there is some adroit use of dance band jargon, and a great deal of purely personal opinion, there is very little appreciation of the fundamentals.

The enormous popularity which Jack Payne achieved, quite apart from the merit of his work, was almost entirely due to his immediate appreciation of the fact that he did not go to the B.B.C. to play music for dancing.

Personality Counts.

He created a new form of entertainment, and in doing so certainly became the B.B.C.'s best licence-seller. Whoever the B.B.C. chose as his successor found the greater part of his row hoed for him. If Henry Hall can live up to the popularity of his predecessor, his success is assured, even though his standard of performance should prove consistently low. That popularity is far more a matter of personality than musicianship, and it is here that Henry Hall must look to his laurels.

I visited the Palladium on almost every occasion that Jack Payne figured in the programme. Many of his performances were good and warranted the applause they received, but they were never outstandingly better than similar performances by other well-known bands. His radio personality was entirely responsible for his phenomenal stage success. On one occasion, when either he or his men were tired or out of sorts, he put up a really bad show.

It made no difference whatever; the house rose to him, as it had always done, and he took his dozen or so curtains, and was called upon to make his usual speech to what is probably the most critical variety audience in the world.

The same can be said of his broadcasts. By whatever standard we assess them, it has to be admitted that they were sometimes definitely bad; yet they invariably headed the list of appreciations in the weekly analysis of correspondence on programmes, and the few letters of criticism could always be associated with the kind of crank who hates anything suggestive of dance music anyway.

It Suits The Palate.

The fact of the matter is that, whatever the B.B.C. may say to the contrary, the public has got right hold of this new form of entertainment. It suits the palate of the day. It is, and I hope always will be, something individual and different from anything else in the programme.

If Henry Hall tries to win Jack Payne's place in the hearts of listeners by playing them music for dancing, he will fail, no matter how well he performs from a musicianly point of view. If he allows his performance to become in any way a compromise with other forms of broadcast programmes, he may achieve some popularity within Broadcasting House, but listeners will never forgive him.

A Grave Mistake.

They expect him to progress and improve but not to change the character of their favourite hour. He has already committed one error of inexperience. He allowed himself to be caught by a wily journalist into giving in an interview an account of all the alterations he proposed to introduce when he took Payne's place before the microphone.

How much of this he really said, and how much was garbled, I do not know, but if he said anything at all, he was foolish, because his strength lies in his

(Continued on next page.)

THE SIXTEEN-YEAR-OLD OBOIST!

Henry Hall was certainly not afraid to give youth a chance, for this member of the orchestra is only sixteen! He is Richard Matthews, and the rest of the players look on Richard as their mascot.

THE NEW B.B.C. DANCE ORCHESTRA

(Continued from previous page.)

ability to grasp the fact that the public likes in principle the kind of show it has become accustomed to.

He Stands Alone.

While this ready-made popularity makes Henry Hall's initial problem easier, it may also prove to be his undoing. He can inherit the audience and the popularity of the type of broadcast if he is wise enough to leave well alone, but he must develop his own radio personality.

Here he has got to stand entirely alone, for I warn him that he will get no help from the B.B.C. Individual success is only achieved at the B.B.C. at very considerable cost. When Jack Payne left there were very few tears shed among the staff. Admittedly, he was "tetchy" and *difficile*, and by no means easy to work with, but he sacrificed everything to make a success of his job.

An Easy-Going Disposition.

So far as the public is concerned, he was justified, and if hero-worship was his aim, he certainly registered a hit. It is within the power of Henry Hall to be just as big a success, but it remains to be seen whether he can do so and still keep friends with the B.B.C.

If he is incredulous of the good fortune which led to his selection, it will do him no harm, and may possibly help him to avoid bruising his heel on the stony path he has to travel if he reflects that the choice may have been influenced by the fact that he is, perhaps, more easy-going than his predecessor, and therefore more open to coercion.

I do not wish to add to the difficulties of his new position, but I cannot help feeling that there are quite a lot of people in whose shoes I would sooner stand than Henry Hall's at the present moment. Time alone will show whether he will become the tool of those who are only too anxious to shape his destiny for him; whether he will become another public hero, or whether he will find the via media which will keep his part of the programme safe from the ravages of the uplift experts, and at the same time earn the undivided praise of both the public and his immediate colleagues.

His task is difficult almost beyond conception, but I believe—from an all too brief acquaintance—that he has got it in him to succeed if he is given a fair chance.

From the purely technical point of view, he seems to be well-equipped. I have heard the new band broadcast twice. They are obviously unaccustomed to the work, and have got to settle down and "find their feet." It is hardly fair to criticise yet, but there are one or two points which stand out.

First of all, the standard of collective and individual musicianship is definitely high. The band shows no tendency to exercise the licence which is erroneously supposed to be the right of dance bands to play out of tune.

The orchestrations are simple enough to be executed without loss of theme, though I am glad that Hall has not fulfilled the threat attributed to him in one daily paper to eliminate anything which even remotely approached what Americans call "hot playing."

He has a clarinet player whose rendering of these more exotic passages is quite the best thing I have heard. His first saxophone, if a little too full for the remainder of the section he leads, has such clean style and fine tone as to put him right in the first rank of performers on this instrument.

Some Slight Criticisms.

I cannot say as much for the tenor; he is "reedy" and rather thin of tone, and does not seem to be able to hold his pitch on the low notes. I know that Hall does not approve of too much brass, but I think he is holding it down too much, particularly as he has such a good first trumpet player whose tone and precision is quite delightful. After an era of cultivated "muddiness," which the players of this instrument have allowed the coloured American players to teach them, it is even more pleasant to hear really good playing and absolute certainty of pitch.

I am frankly disappointed with the rhythm section. It is probably to a large extent a question of balance. I will leave it at that, with this remark: that, excellent as their work is in all the other fields of operation, the staff which the B.B.C. maintains for balancing orchestras in the studio have not the smallest idea of how to balance a band for this type of performance.

On the whole, I am very pleasantly surprised by the new band. I find their performance restful after what one has become accustomed to. Adjustment of balance will probably put right a certain lack of fullness, and I strongly recommend Mr. Hall to tackle this problem himself without the help of the experts, just as Jack Payne found it necessary to do.

VAL THE VOCALIST

In the centre is Val Rosing, who sings the songs, and on his right stands the orchestra giant, F. Burton Gillis, who is six-feet-seven in height! Accidentally mirrored to the left is an enormous "ghost," which is probably how the giant looks to little Richard Matthews (right), the oboist.

TIPS FOR CONSTRUCTORS

Taking Wires through Screens, Terminals on Pentodes, etc.

A wrapping of insulating tape or a short length of Systoflex should always be placed over wires which pass through holes in the screen.

* * *

Never use pliers to tighten up the terminal on a pentode or a screened grid valve, as the threads easily strip on these.

* * *

When stripping the top cover from a flexible lead, search for and remove the single thread of cotton that runs in a continuous length along the rubber insulation. When this is removed the outer covering is stripped much more easily.

* * *

The ordinary cheap flex, obtainable at a few coppers a yard, is hardly good enough for reliable mains connection, and it pays to ask for best quality flex when such a lead is being installed.

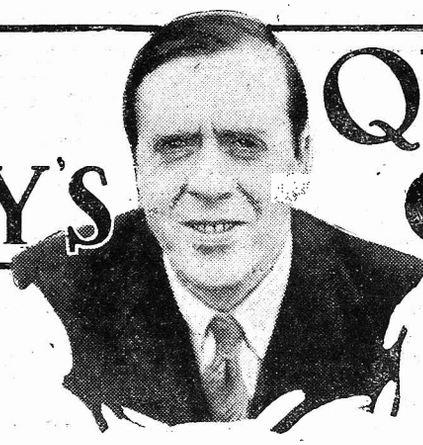
* * *

Most electric light companies will undertake to install loudspeaker extension wiring, etc., when wiring up a new house, if requested.

* * *

When making connections to a wire-wound resistance be very careful not to tighten the nuts excessively, as if it should turn, this would break the very fine wire which is connected internally to it.

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.

Interference from Trains.

A. B. (Catford).—"Electric trains run past the back of my house, and before a train passes I hear a series of clicks from the loudspeaker. Can you suggest a cure?

"I believe that the trouble is caused by signalling apparatus."

I fear there is no real cure. You should try and get your aerial as far away from the railway as possible.

The only way to stop the nuisance is for the railway to eliminate the interference at source. This they are not forced to do.

Sometimes tramway and railway companies are very kind, and do their best to eliminate interference. At other times they find the problems too difficult or the solution too costly.

The B.B.C. would help you in this. They know how to get into touch with the authorities, and it is, as I said before, the railway people alone who can really help.

* * *

Duplicating Earths.

P. B. (Catford).—"I have been told that using two earths is undesirable.

"For some time past my earth system has consisted of a lead taken to the main pipe and also another lead from the earth terminal to a plate buried in the ground. I was under the impression that this would ensure a good earth at all times.

"Now I am rather doubtful and would like to know whether I would get better results if I did away with one of the earths and only used say the water-pipe?"

Why not try it and see?

In general, one can say that there is no gain in putting one very good earth (water pipe) in parallel with another very good earth (buried plate), and there might conceivably be a slight disadvantage in doing so if one was slightly worse than the other.

The bad thing to do is to put a bad earth in parallel with a good one; that may result in just a bad earth. One good earth is simplest, two good earths in parallel is possibly not so good. But I'll bet you would not notice much difference if you disconnected one of your earths, provided they're both good. Why not try it and see?

* * *

Grid-Leak Detection.

J. M. (Gidea Park).—"I find that a milliammeter connected in the plate circuit of the leaky-grid detector of my set reads 5 milliamps. when the set is not tuned to any station. When, however, I tune in either of my local stations the reading falls to between 3 and 4 milliamps.

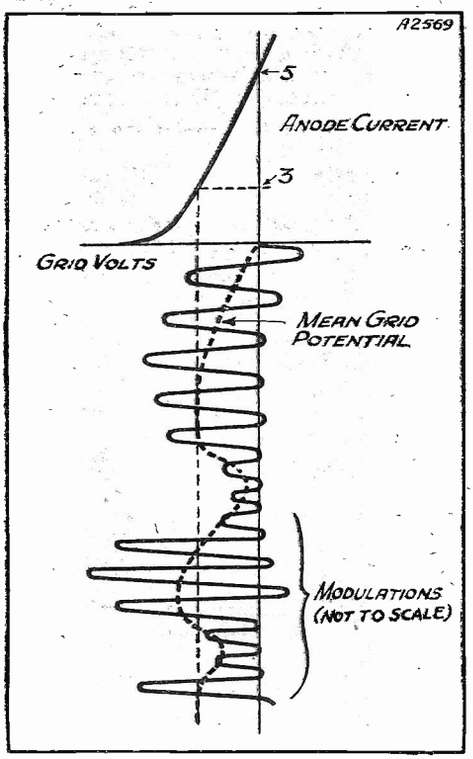
"Is this in order."

It is "in order" in degree if not in quantity. A leaky-grid detector works in this way:

1. Before signal the valve passes (say) 5 milliamps., just like a good valve will.

2. A carrier (not modulated) is tuned in. Analyse it very slowly. First there is a positive grid swing, then a negative, then a positive, and so on. At the first positive swing electrons flowing past the grid get attracted to the grid because that grid is (+). Quite a lot collect on the grid and tend to flow back to the filament. But the grid circuit is not conductive—it is "leaky" only, and the electrons flow very slowly.

DETECTOR ANODE CURRENT



With the aid of this diagram Capt. Eckersley explains to J.M. why the anode current of a grid detector falls when a station is tuned in.

3. The grid goes negative and the negative charge remains in the grid, only slowly leaking away.

4. The grid goes positive again and collects some more electrons. But not so positive as before, because it already carries a lot of electrons.

5. The same as 3.

6. The same as 4.

Look at the diagram. This shows the momentary potential of the grid during several swings of the carrier-wave potential.

Note that after a few swings taking only a few millionths of a second, the whole grid potential has gone negative—steady negative, and so the current reduces from 5 to (say) 3 milliamps.

But if we modulate the intensity of the carrier wave the *mean* grid potential changes according to the modulations, and we thus get rectification. But if we reduce the mean grid potential too much we get bad quality because we start going round the negative bottom bend of the valve characteristic.

So it is better to let the carrier wave reduce the current by about 10 to 15 per cent, no more in usual practice.

* * *

Wireless Warmth?

M. H. L. (Richmond).—"Why is it that a chill seems to descend on to a room when the radio suddenly stops at the end of an evening's programme? I have often noticed this, and some friends, to whom I have mentioned it, also say that they have experienced this weird effect.

"Is it because the sound waves from the speaker actually have been warming the air of the room?"

Sir! Before I will answer this question you will answer some of mine!

(1) Buy a thermometer. Switch off the wireless. Does the thermometer mercury, or spirit, descend in the tube?

(2) If it does, do the same experiment at different times in the evening, carefully observing whether the fire is dying down or burning up.

I suggest you will be unable to correlate wireless, on or off, with temperature unless—

(a) You have a set worked from D.C. mains, and when it is on it is possible to feel a considerable heat arising from it.

(b) You have a poor electric heat supply which is robbed by the wireless set.

I suggest you usually switch the set off fairly late when the fire is dying and the night is getting colder outside, and that your attention, free to wander when the noises have ceased, feels a growing chill.

You are not by any chance leg-pulling?

MORE ABOUT THE MODERATOR

Some further details regarding "P.W.'s" new power-selectivity scheme, together with a description of the construction of the "Moderator" coil.

By G. V. DOWDING, Associate I.E.E.

YOU can easily make a Moderator coil yourself, for it involves no complicated windings. In fact, it is a job which anyone can tackle without previous experience of coil-making.

The main item needed is a "P.W." "Coil Quoit"—an article which costs sixpence, and is very easily obtainable.

Then you will require a small quantity of number 30-gauge double silk-covered wire. Thirty feet will be ample, but if you do not happen to have some of this wire in your possession already, you will have to purchase rather more than is necessary, for the shops don't sell wire by the ha'pennyworth!

However, the remainder will no doubt come in useful on some future occasion.

Now for the winding. Fix the end of the wire to one of the holes provided for the purpose in the Quoit, leaving three or four inches for connecting purposes. This represents one of the two terminals on a commercial Moderator coil.

How to Wind It.

Now evenly wind on twenty-one turns in the form of a single layer, and at this point, the twenty-first turn, make a small loop to act as a tapping. A half-inch loop will suffice, and don't forget to remove carefully the insulating material from it.

Now continue with another six turns wound (in the *same* direction) over the first layer, and make a second loop. The coil is completed by putting on this second layer eight more turns (same direction of winding), at which point you thread the wire through the second hole and cut off, leaving enough to spare for a third loop. Thus you have a coil of thirty-five turns, with tapping loops at 21, 27 and 35 turns.

The second terminal of a Moderator Coil does not directly connect to the winding, but has a short lead fixed to it, this lead terminating in a plug or crocodile clip for making connection to the required tapping point—one of these points being the actual end of the winding.

Fixing the Coil Quoit.

You need not worry about fixing sockets for the tapping points—a small crocodile clip answers the purpose quite well, but do not attempt to "make do" with twisted wire connections, for that practice inevitably results in breaking the wire after a short while.

Some Coil Quoits have small brackets by which the article can be screwed vertically or horizontally to the baseboard. Where brackets do not exist, the Quoit can still quite easily be mounted with the aid of a strip of wood passed through it, or over it (according to its position), each end of the piece of wood being screwed lightly to the baseboard.

I hinted last week that it may happen that in cases it is difficult to apply the Moderator scheme. You see, there are so many different kinds of aerial tuners and tuning circuits—some of which are, to say the least of it, peculiar to the extreme!

I endeavoured to indicate simple methods of determining the possibility and suitability of "Moderating," but it is certain that there will be people who will find it quite impossible to say definitely whether their sets will respond to "Moderation" treatment until they have actually tried it.

And just as inevitably, there will be a percentage of enthusiasts who will make the experiment, and fail to obtain the results the fortunate majority will enjoy.

Fortunately, there wouldn't be a great financial loss if the uses of the Moderator Coil ceased at "Moderating" in the full sense of the word. But it doesn't. The Moderator Coil and the ·00075-mfds. condenser together, comprise the elements of a quite efficient wavetrap.

And in this guise you will find them quite able to suppress a badly interfering local station without robbing the set of station-getting powers.

All you have to do is to remove the aerial lead from the set, and connect it to one end of the Moderator Coil winding (one of the two terminals on the commercial Moderator Coil unit). Then join the other end of the winding (or the other terminal on a complete unit) to the aerial terminal of the set by means of a short length of wire.

Finally, connect one each of the two condenser terminals to the above two points. As a refinement, the coil and the condenser can be built into a small wooden box, on to a miniature baseboard and panel, or even into the set itself.

But it should be noted that this rejector wave-trap, for such it is, will deal with only the medium-wave stations.

For Long-Wave Selectivity.

You could quite easily make the device serve a useful long-wave purpose by merely removing the tapping-plug or clip when you are on the long waves. (With the home-made coil, disconnect one end of the coil itself, making certain you leave the aerial lead joined to one side of the condenser, and the other terminal of this joined to the aerial terminal of the set.)

The coil is now out of circuit, and the small variable condenser operates as a series selectivity device. And you will find that in the majority of cases it does this quite well.

In regard to the use of the Moderator system for "Moderating," I find I have so far failed to mention something of vital importance. This is that you cannot couple a Moderator coil with a shielded tuner—one of those tuning units in a metal case.

Canned Coils.

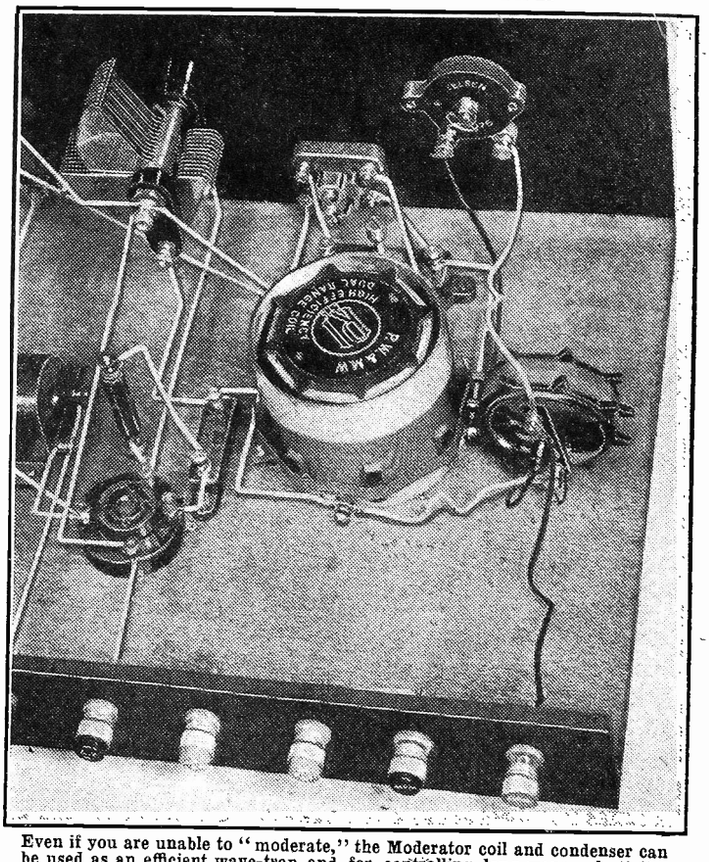
The metal casing, or "can," is provided for the purpose of preventing the coil itself from coupling with anything outside. But in a simple detector-L.F. single-circuit tuning type of set, such screening plays little useful purpose, and you can at least try the experiment of removing the can in order to "Moderate."

I've tried doing this with various makes of "canned" coils, and in certain instances enormously improved results were obtained, the mere removal of the shielding having quite a bit to do with it!

However, if you too, find this, don't immediately start calling the coil maker names, for shielding in multi-valve sets is an essential feature of design, and that your coil is shielded means that the designer thereof had had H.F. amplifiers in mind.

There is quite a lot more I'd like to say about this Moderating business, but I fear I will have to ask our Query Editor to take up the story in his "Radiotorial" columns in future issues.

WIRED AS A WAVE-TRAP



Even if you are unable to "moderate," the Moderator coil and condenser can be used as an efficient wave-trap and for controlling long-wave selectivity, as is explained in the accompanying article. In such a case, however, the Moderator Coil does not have to be placed near any other coil in the set. As shown above it is rather too close to the dual-range coil.

HOW WIRELESS WOULD HAVE ALTERED HISTORY

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

No. 2. ON THE SPANISH MAIN

DESPITE the defeat of the great Armada and the thwarting of that attempt to conquer England, Spain was for long the greatest of the sea powers; and, with a monopoly of trade in the New World, conferred on her by Papal Decree, was able to derive great wealth from the exploitation of the Indies, as Central and South America were called in those days.

Her mariners had solved the problem of navigating long distances under sail at sea. Every year great galleons laden with gold, silver, precious stones and other valuables set sail from the Spanish Main bound for their own country. With this wealth the Spanish kings were able to maintain great armies and remain the dominant power in Europe.

Those Buccaneers.

But the first real challenge to Spanish ascendancy in the wealthy West Indies came from a few poor sailors from England and France who, in their turn, wished to trade with these rich territories.

Their first objective was the herds of wild cattle on these islands, which they hunted, preserving the meat by smoking it. In the Caribbean this was known locally as "buccan," and this gave rise to the name of "buccaneers." These seamen commenced as legitimate traders, legitimate, that is, in so far as they refused to recognise the Spanish monopoly.

But they were harassed and persecuted by the Spanish governors, and presently, in their rage, joined together and threw down the gauntlet to the Spanish power.

Later they degenerated into pirates; but they did not begin as pirates, and considered themselves perfectly respectable merchants, forced to take action for the defence of their trade.

Their Island Rendezvous.

Their advantage lay in the fact that they were able to attack the Spanish possessions by surprise, and before news reached the stronger Spanish forces, or before the Spanish could concentrate, they had departed again. Indeed the only factor in their favour, in this apparently unequal contest, was that of surprise.

If radio had existed in the days of the Spanish Main, many of our naval victories might have been impossible. The great Spanish galleons laden with treasure would have had warning of the approach of the British buccaneers and the English ships would not have had such easy prey. This is the subject Commander Kenworthy deals with in this, his second article

If the Spanish governors and Admirals had had wireless they could have quickly gathered their forces and overwhelmed the buccaneers. But they never knew where and when the blow would fall; their ships and troops were scattered, and again and again they were overwhelmed by a sudden descent.

A BOLD BUCCANEER

A born sailor and leader, Sir Henry Morgan was a constant thorn in the flesh of the Spaniards. His surprise tactics were always threatening their overseas possessions, and he raided and plundered them with the utmost skill.

The headquarters of the buccaneers from the year 1630 to 1655 was the small island of Tortuga in the West Indies, which they captured and converted into a stronghold.

From here they set out on their expeditions, and here they returned with the loot and treasure they had seized. Again and again the Spaniards would fit out an expedition, lay siege to Tortuga, capture it, install a garrison and think all was well.

A Born Fighter.

Then once more the buccaneers would gather their forces and fall upon Tortuga, recapturing it. Once again it was the absence of sure means of communication such as wireless would have provided that favoured them. Growing bolder, they actually captured the island of Jamaica in 1655, and with their growing power began to paralyse the Spanish trade.

Their greatest leader was a Welshman, Henry Morgan, who was recognised and knighted by King Charles II of England, and made deputy-governor of Jamaica. A man of tremendous courage, and a born leader, he was a thorn in the flesh of the whole Spanish system in the West Indies.

In 1671 he suddenly appeared on the mainland of the Isthmus of Panama with an overwhelming force. Yet the Spaniards had far greater forces in ships and men, if they could have been summoned.

Shocks for Spain.

But Morgan captured the city of Panama, and took care that no Spaniards escaped to carry tidings of what he was planning. Next he seized the Spanish ships lying in the Bay of Panama, on the other side of the Isthmus, and ravaged down the south Pacific coast of America, taking the rich colonies of Spain completely by surprise.

They had no means of summoning help, for they were isolated from each other. Nor could they be warned of their danger in time to prepare a defence.

Eventually Morgan departed with rich plunder in the captured ships. He sailed South, away from the pursuing Spanish forces hastily gathered together; and

(Continued on next page.)

HOW WIRELESS WOULD HAVE ALTERED HISTORY

(Continued from previous page.)

rounding Cape Horn beat his way northward to the West Indies and his stronghold in Jamaica. The Spaniards knew nothing of his movements till he reappeared in the Caribbean.

Morgan had many imitators and successors and the growing boldness of the buccaneers almost broke the power of Spain in the Indies. And as the power of Spain declined and her might as a sea power waned, so the English increased in confidence and strength and gradually supplanted the one-time Mistress of the Seas.

"Jenkins' Ear."

The lesson of this period is that Spanish power was weakened because there was no certain means of quick communication between the different territories, and the attackers could choose their time and place to attack. In other words, wireless is an ally of the Imperialist Power.

But the worst blow, which proved that Spain had passed her zenith, was the war between England and Spain of 1739. It had, apparently, only secondary results in Europe.

But on the other side of the Atlantic the reactions of this war had far-reaching effects. It was known as the War of Jenkins' Ear. Jenkins was a merchant skipper who had been captured by the Spaniards and had one of his ears cut off.

The Spanish officer who inflicted this punishment said he would like to serve the King of England the same way.

Jenkins was liberated, returned to London, told his tale, and soon had the populace in an uproar. He actually appeared before the House of Commons with his head swathed in bandages and related his grim story.

In 1739 war was declared. Admiral Vernon was sent across the Atlantic with an expedition to attack the Spaniards.

An Epic of Adventure.

Porto Bello was taken with a loss of only seven men on our side. Such an exploit would have been impossible if wireless had existed; for the place could hardly have been taken except by surprise.

Indeed, when the news of war had reached the Spaniards, an attempt by Admiral Vernon to repeat his success on Cartagena failed. This was a weaker fortress than Porto Bello, but the element of surprise was lacking, and it held out.

But another expedition to the other side of the South American continent under the famous Admiral Anson was even more successful.

Starting out with six ships, the largest of which was the Centurion, Anson made for Cape Horn, with the intention of attacking the colonies on the Pacific side of South America, just as Captain Morgan had done, starting from Panama; but in the reverse direction.

Disease broke out amongst his crews, some of his ships were lost, and eventually the survivors were concentrated on board his flagship Centurion and the Gloucester.

By this time, out of 961 men who had formed the crews of the original squadron, only 335 were left alive in his two remaining ships!

But he had reached the coast of Peru, and again his arrival was a complete surprise. The Spanish colonists had no news of such an expedition being on its way.

Several rich towns were taken and plundered and much booty collected. But then the Gloucester ran into a gale, was dismasted and sank. Anson was left alone in the Centurion and she, his last ship, was in a pitiable state. She was leaking badly, her rigging was rotten, her spars sprung and her crew dying fast of scurvy.

Nevertheless, the gallant Admiral continued his voyage up the coast; for he meant to intercept the great Spanish treasure ship, the annual galleon leaving for Spain with the year's harvest of riches.

Eventually on the 20th of June, 1743, Anson sighted the ship, the great prize for

THE GREAT LORD ANSON

Starting as a cabin-boy he became Admiral of the Fleet and a Peer of the Realm, his most magnificent feat being an expedition against the Spanish treasure ships. Although his crews were decimated by scurvy, he nevertheless found his objective, captured it with a fantastically inferior force, and then sailed round the world—a very rare feat in those days—with the spoils! And when—years later—he brought the enormous treasure safely to Portsmouth the Chancellor of the Exchequer nearly fainted with joy!

which so much had been risked and so many perils faced.

In spite of the fact that she carried 550 men to his miserable remnant of 201, and 70 guns against the Centurion's 60, she was forced to surrender after a sharp fight. She bore the high-sounding name of Nuestra Señora de Cobadonga, and a treasure worthy of such a title.

If the Spaniards had had wireless they would have kept this ship in harbour until Anson was accounted for. In the meantime, no word of the expedition had reached England, and the nation thought that Anson and all his ships had perished.

And, indeed, nothing was heard of him until nearly four years after he had sailed from home. In the meantime he had circumnavigated the globe. Placing a prize crew on board the galleon, he sailed for China and reached the port of Canton, where he sold the Spanish ship, transferring all her wealth on board the Centurion, and sailed for home.

But on the very threshold of final success he was almost captured. For by this time war had also broken out with France. A French fleet was in the Channel, and Anson, with all his treasure on board, actually sailed through the enemy vessels in a fog, finally anchoring off Portsmouth on June 15th, 1744.

The great Spanish galleon carried wealth amounting to over £1,250,000 sterling, and the total proceeds of this expedition were worth more than two million pounds, an immense sum in those days. The money arrived at a time when the Exchequer was exhausted and the country hard pressed.

Cabin Boy to Admiral.

It enabled further ships to be fitted out, and the two wars to be brought to a successful conclusion. Anson rose to high rank in a service which he had entered as a cabin-boy and, after other famous victories, died a peer of the Realm and an Admiral of the Fleet, loaded with honours.

Yet, if Marconi had been born before him, he would never have been able to strike these shrewd blows at Spanish power, or to have done so much to lay the foundations of British sea supremacy both in commerce and in war.

A NOVICE MAKES THE "COSMIC"

—and gets 80 stations.

By D. G. LUCY.

A GROWING interest in foreign languages, plenty of spare time, and POPULAR WIRELESS have been instrumental in making me a "wireless fiend." A copy of POPULAR WIRELESS attracted my attention on a bookstall; a train journey resulted in a determination to make the "Cosmic" Three; and this article is the result of the "Cosmic" Three.

Many years ago, in the Dark Ages of wireless, my brother was one of the noble band of heroes who listened in to 2 L O on the 'phones; a three-valve set was one of his many triumphs, and of this curiosity a few parts still remained. Three valve holders, a transformer, a few grid-leak holders, and a condenser were quickly unscrewed, and with the other parts bought from the shop at the corner, made a goodly show when arranged as in the blue print.

On a 20-ft. Aerial.

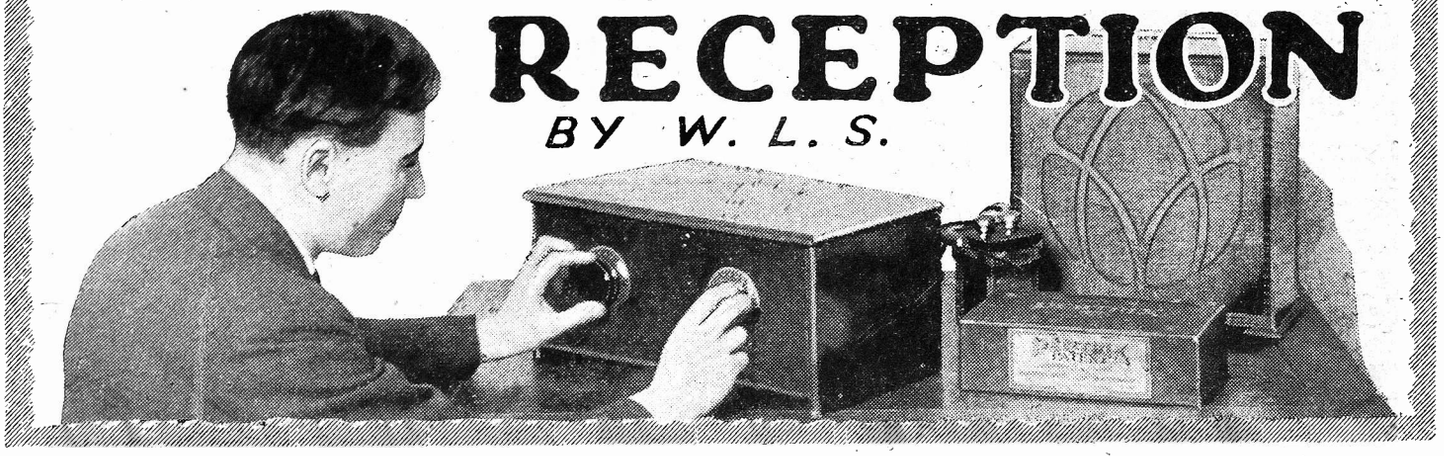
Two and a half hours later I switched on! A few extremely faint howls reached my delighted ears; in a few moments I was listening to the sugary strains of Reginald Dixon, from the North Regional transmitter.

After a few minor adjustments, I sat down in earnest to "rake the ether," as the advertisements say. On the first night, with a low 20-ft. aerial, I got about 25 stations. The list has gradually grown, until now I can get about 80 stations, all at good entertainment strength on the loudspeaker. The short waves have not yielded many stations, yet, except stations like Zeesen, Radio LL, and Lisbon.

The only fault I have to find with the set is the fact that never again will I be able to have the thrill of listening to Reginald Dixon for the first time!

IMPROVING YOUR RECEPTION

BY W. L. S.



A practical article in which a popular "P.W." contributor gives readers some useful hints on how to "hot-up" their receivers.

ALTHOUGH most people reading my initials at the head of this page will probably associate the following article with short-wave work, it is intended to apply also to the ordinary broadcast listener. As a matter of fact, it *does* concern the short-wave man rather than the others, but then so do all general articles on improving the efficiency of a receiver!

I have set out to try and answer a question that I am so often asked: "Why is it that two sets made from similar designs can be so totally different; and why do you sometimes find a set that is beautifully easy to handle, while another, and quite similar set, is a perfect brute?"

"Look to the Det."

Yes, readers, it *is* a big question; and you are wondering how I have summoned up the cheek to attempt to deal with it in such a small space. The answer is that I haven't—I am merely passing on a few disconnected hints.

First and foremost, let me say this—if you have a set whose behaviour is of the "untameable" variety, *look to the detector.* The printer would convey my meaning if he put those last words in the biggest capitals he possesses.

Very often in a large multi-valver the H.F. stages give trouble, but far more often the detector is not doing its bit. Furthermore, figures still prove that the vast majority of sets in this country are comparatively simple three-valvers, mostly without H.F., and in these cases there is very little that *can* misbehave itself except the detector.

"Ploppy" Reaction.

Now to get down to details. The "misbehaviour" may consist of several things. First and foremost I should place "ploppy" reaction. There is no need for me to detail the gruesome symptoms—you all know the sickening thud with which some sets go in and out of oscillation when you move the reaction control, even with the lightest touch. Your set is not oscillating—you hear faint music—up comes the reaction control, the music getting louder, louder and clearer, then—ser-r-reech!—you are oscillating hard and you have to go back and do it all over again. Think of the man next door, too, if he is listening to that particular station!

Now to cure it. First, see how much H.T. your detector is getting; seven times out of ten you will find that bad reaction control is caused by excessive H.T. on the detector. If reducing the H.T. doesn't effect a cure, try the opposite—*increase* the L.T. *slightly.* This doesn't mean putting 6 volts on 4-volt valves! It merely means—see that your detector valve is getting all the L.T. volts that you think it is.

Dirty switch contacts, long straggling flex leads to the accumulator, filament rheostats in particular (although one seldom sees them in use now), all have a knack of bringing down your voltage just sufficiently to lead you into some kind of trouble.

Lastly, look to your grid-leak. Very often the substitution of a leak of higher resistance than the one in use will cure ploppy reaction without any other adjustments being made.

Another annoying trouble that we all know is "hand-capacity." This is more prevalent on short-wavers than any other receivers, and is generally due to poor layout and unnecessarily long wiring. *Of course,* you must have the moving vanes connected to earth; if you do not do this you may be quite certain of trouble. Also, as I have often remarked, one very useful cure for this on short-wave sets is to *remove* the earth.

You may look upon these as two very small difficulties, but the combination of ploppy reaction and hand-capacity effects is often deadly enough to make strong men break down and weep! Not only does the set shriek at you just as you are getting your station nicely, but when you have repeated the performance ad lib., and really found him, he disappears the minute you move one finger away from the dials. And yet there must be thousands of sets like this still in use (although not by readers of "P.W.," of course).

L.F. Instability.

Next to these two detector troubles comes an L.F. trouble, generally some form of instability. It is surprising how many folk think that the L.F. part of their set must be in order if it doesn't happen to howl. The point is that an L.F. stage or stages can howl at a wonderful variety of different frequencies, only a very few of which are audible to the ear.

Very, very often can bad quality be traced to an L.F. valve that is whistling away happily to itself at a frequency of 20,000 cycles or so—well above the audible range. If you find that holding your fingers across the L.F. transformer secondary improves your reproduction tremendously you can be quite sure that something of that sort is happening. The fairly low resistance of the path through your fingers damps down the secondary circuit sufficiently well to make the whole thing stable.

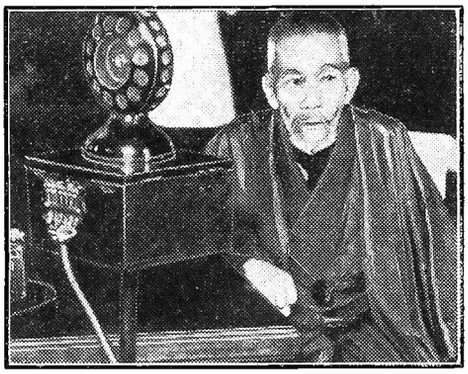
Try a Leak.

If you cannot cure this trouble by reversing the transformer connections or by altering the grid-bias (and defective G.B. batteries are a frequent cause of it), try the effect of a fairly high leak across the secondary; start with 2 megohms and don't go below ·5 megohm if you can help it. This applies particularly to short-wavers, but is often of help with other sets as well.

Instability due to lack of de-coupling is another frequent cause of poor reception.

Space prevents me from giving any further details, but in a later article I may be able to deal with some of the more complicated faults and their cures.

BROADCASTING IN JAPAN



TSUYUOSHI INUKAI, who is a 78 years old member of the present Japanese government, broadcasting his election speech from Tokyo recently.

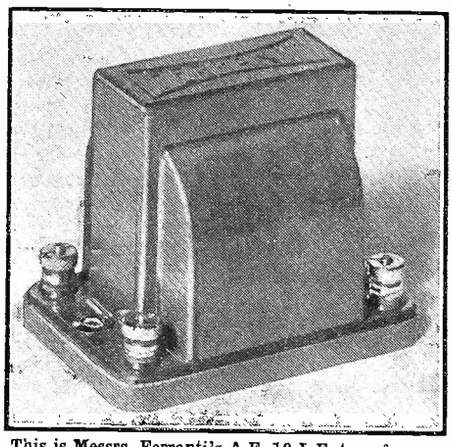
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

FERRANTI'S NEW TRANSFORMER.

THAT great Hollinwood factory which produces transformers for the Grid Scheme as big as houses (or, at least, cottages!) has turned its attention to the "cheap" L.F. transformer market.

AND NOW THE AF10!



This is Messrs. Ferranti's A.F. 10 L.F. transformer. The casing is bright red in colour.

For years it has been supplying aristocrats of the class, but obviously at prices above the purses of many constructors.

But with more and more of the cheaper transformers making their appearance, I suppose Hollinwood gradually came to the conclusion that as there was a "cheap" market which had to be catered for, there was no reason why it shouldn't have the advantage of the best that Ferranti could provide at such prices.

If I am right, and I have little doubt but that I am, then all I can say is that Ferranti are to be congratulated upon their decision and the result thereof.

No one has suggested that their new A.F.10 is a perfect transformer—certainly they haven't—and, anyway, there is still the A.F.3 or the A.F.5 for those who can afford them, but all the same the A.F.10 is a Ferranti, and that means careful design and production and a reliability which will be the envy of the cheap foreign markets.

We have tested A.F.10's and I have no hesitation in saying that we find them *markedly* superior to some components in the same price class—which, in the circumstances, is not surprising!

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.

RELIABLE RESISTANCES.

Although it is very easy to pile up resistance where you don't want it, and thus cause inefficiency and an undue wastage of energy, it is by no means so simple to create uniform values of resistance when it is desired to turn that factor to good account.

Resistance as such is easily obtainable, it is the uniformity that presents the difficulty. Especially is this the case when the circuit concerned has to pass a fair amount of current.

An example is the anode circuit of an amplifier—the resistance being required for coupling purposes.

It has long since been realised that the ordinary graphite or carbon compound is unable to provide the required stability; not only does it tend to alter in resistance as with different potentials, but it does not easily resist temperature changes and mechanical stresses.

But in recent years special materials have been developed which are perfectly satisfactory. That used in the Graham-Farish "Ohmite" is a very good example.

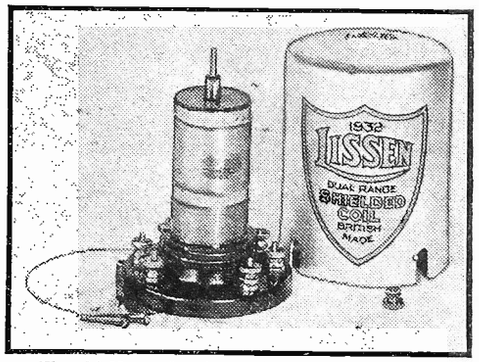
For instance, there is a 2,000-ohm value capable of carrying 10 milliamperes of current without the slightest trouble—there is a wide range of values available, but I mention this one as it is a haphazardly selected sample which formed the subject of my recent tests.

And these tests were, strictly speaking, quite unnecessary, for we have used numbers of Graham-Farish "Ohmites" in various of our sets, and they have given us no occasion to regret the choice.

NEW LISSEN LINE.

Lissens have a very good name for coils. Some of you will no doubt remember their plug-in types, and there will be not a few who are still using them.

A COMPACT COIL



The shield can be removed merely by unscrewing one small, milled nut.

These Lissen plug-ins were veritable highlights in a field of mediocrity and actual duds. In fact, I remember that there was a time, and not so far back in the calendar either, when it was safe to specify only about two or three makes of coils out of some score or more which were on the market. And Lissen's were, of course, included among that two or three.

Then they were first in the field with the once vastly popular "X" type of coil.

And now they have brought their coil activities right up-to-date with a Dual Range Shielded Coil.

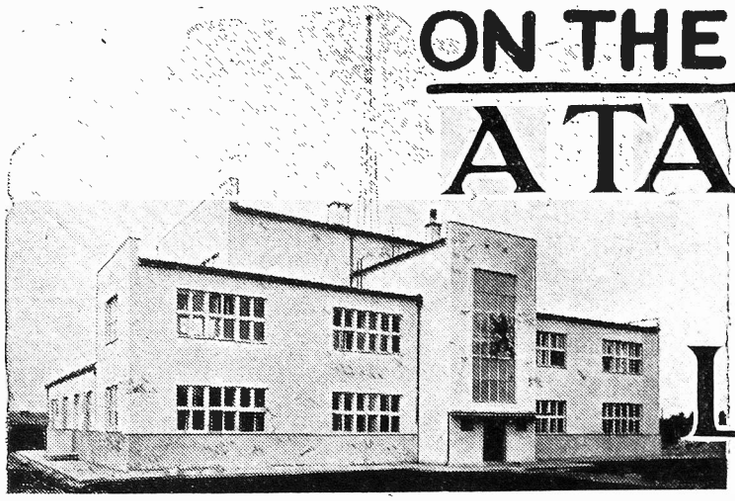
It is a complete two-band tuner and comprises medium and long-wave windings and reaction. Being made to close margins of inductances, the Lissen Coil can be ganged either in band-pass or simpler arrangements.

It is small in size, and its shielding enables it to be built into compact multi-valve instruments. Additionally it can of course, be used with good effect in the more modest types of sets.

On test we have found it right up to the standard set for the best coils of its kind, and in that it costs only 6s. 6d. it will be gathered that it is an item which represents good value for money.

ACCEPTED WITH ALACRITY

The jolly gathering at the Lewcos Annual Staff Dance. Two members of "P.W.'s" staff received invitations, and "a good time was had by all!"



ON THE OTHER SIDE
A TALK WITH A CZECH LISTENER

By Our SPECIAL CORRESPONDENT

Here is another article of a fascinating series, and this time we introduce the British listener to his contemporary in Czecho-Slovakia.

A REPRESENTATIVE of a Czech labour movement introduced to me by a Czecho-slovakian Legation official who heard that I wanted to know all about their national broadcasting, spent a whole of one afternoon chatting about his pet topic.

Frankly, I didn't know much about the state of affairs. I had never been within three hundred miles of Prague. I know no Czech.

Comparatively Few Listeners.

Our little talk remedied matters!

"My country comes sixth in the list of European broadcasting and there are now 353,052 listeners," he said. "We are lucky in having six stations and since the new huge Prague station opened, using a power of 120-kilowatts, the number of listeners has gone up with a jump. It has made a big difference to owners of small sets in country districts."

"What sort of sets are used?"

"Crystal-set listening is now popular in a circle about 50 miles' radius around the new Prague station. This transmitter is not, of course, right in the main city. It is at Liblice, which is 18 miles out. It is a huge station.

"The big electric works at Kolin, in the Elbe basin, supply all the power. Overhead landlines connect Liblice with the power supply. Liblice takes 450 kilowatts.

A Historical City.

"Did you know," he continued, "that Prague is a historical city, as far as wireless is concerned?

"The old Prague-Kbely station was once the first station in Europe to be working regularly. Later the Prague-Strasnice station was reckoned to be the most powerful, while the station building was being erected, but by the time the programmes were 'on the air,' one of the German Reichs Rundfunk chain stations capped it in power."

"What about relays?"

"As the Prague authorities are out to help crystal set owners, a number of relay stations are run, all taking the Prague programme. Brno, Bratislavia, Kosice and Moravska-Ostrava all take the main programme. Before our new Prague station opened, Bratislavia, a relay, was more powerful than its main station!"

"Do they relay by wireless link or landline?"

"Our Post Office authorities supply the landlines between the stations and also provide special lines to outside broadcast centres, to the Prague National Theatre, for example.

"The Post Office landline centre in Prague is connected up with the European landline circuit on which your B.B.C. concerts are heard at international programme times. A few months ago, when Toscanini conducted the New York Philharmonic Orchestra, just before his illness. Prague and its associate stations relayed this via Rocky Point and your Post Office reception station at Wroughton."

Providing the Programmes.

"Who runs the programmes?"

"The ordinary programmes are directed by a number of associations, the Masaryk Adult Education Institute, the People's Academy, the Confederation of Non-Manual Workers and so on. These are all societies of working people who contribute to them very much like your Trade Unions over here. These societies provide 'uplift' talks and a certain amount of education."

"Are they considered good, or too educational?"

"A popular opinion is that so much money is being spent on station development at the moment. Bratislavia improvements and the new Prague for example, that programmes are suffering. When the country's relay system is finished this grumble may not be justified."

"What sort of programmes are given?" I pressed.

"They start early in the morning at 6.30 and thereabouts. Gramophone music is given; not talks. Most of the educational talks are given from 5 o'clock in the afternoon onwards till about 7, when the main musical programme starts.

Too Many O.B.'s.

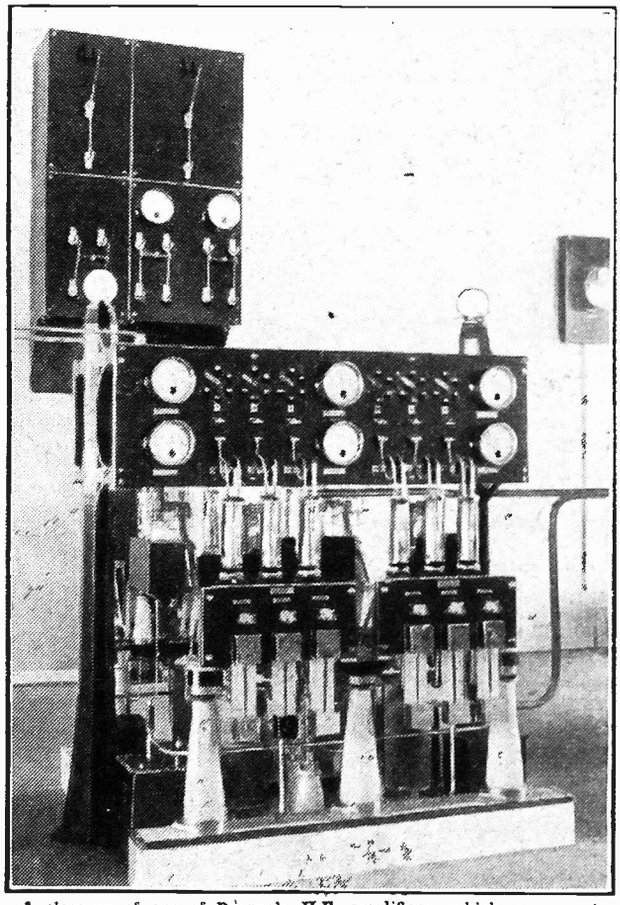
This is because many of the talks are intended for all listeners and not only for housewives. They are fitted in at a time when most people are home from their offices and factories and can hear them before the evening entertainment starts.

"A complaint is that too few programmes originate from the studios. There are, some say, too many O.B.'s. Broadcasts are made from the big Smetana Hall in Prague. These are all orchestral concerts. Dance music is provided by an outside band.

"A relay is often made from the Czecho-slovakian Auto Club, where there is a fine dance orchestra.

(*Continued on next page.*)

THE WORLD'S BIGGEST MEDIUM-WAVER



A close-up of one of Prague's H.F. amplifiers, which carry out their good work on 488.6 metres. Prague is Europe's most powerful medium-wave station—it employs 120 kw., and comes in just above the North Regional.

WIRELESS WOODWORK

Some Hints on Cabinet Construction.

THE cabinet illustrated on this page represents a simple and practical means of obtaining a pleasing effect without much trouble. The ends of the cabinet are cut from material about half an inch in thickness and, after being carefully prepared, the "leg-shape" is cut away at the bottom.

This can be done in a few minutes with a centre bit (see H). The base A is made slightly larger than the baseboard either way, and when cut to length the pieces are "halved" at each end, as shown. Note how the moulding covers the joints and screws holding the sides to the base.

The top of the cabinet, B, is chamfered at its edges as at X, and on its underside are screwed two cleats, D (see sketch and small inset). The top is secured to the ends of cabinet by further screws through the cleats.

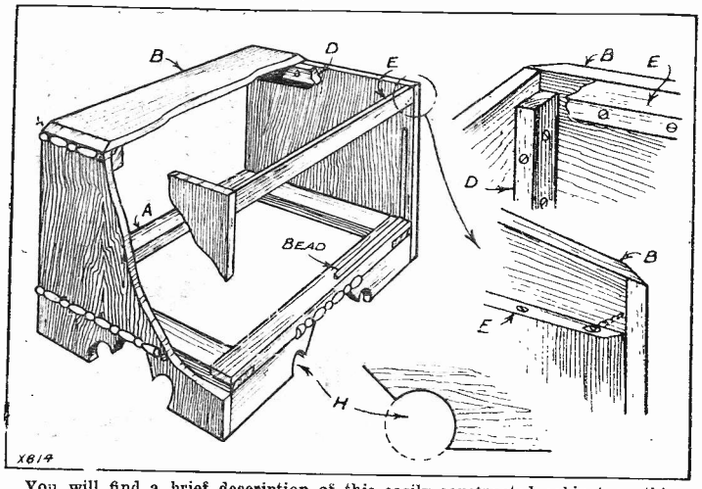
The piece E is next placed in position, and this time "pocket screwed" as seen in the drawing. Afterwards, screws are driven up through the underside of this piece and into the top of the cabinet.

The moulding is then returned round the top and bottom of the cabinet and, last of all, a small "bead" placed where the front of panel is exposed. The front of the cabinet is provided with a shaped base to match the ends, which can be screwed from the bottom into the base framework.

The turned moulding should only be of a light pattern, and can be fixed with small brads. The set is pushed in from behind, and a ply back used to exclude dust.

R. T.

TRY YOUR HAND AT THIS ONE



You will find a brief description of this easily-constructed cabinet on this page, giving all the necessary details for the handyman.

HINTS & REMINDERS

Short Waves—Hand-capacity—Coil Winding, etc.

On a short-waver, removing the earth lead often removes hand-capacity effects without weakening the strength of distant stations.

* * *

Connecting a small variable condenser in series with the earth lead is another good tip for reducing hand-capacity on short-wave sets.

* * *

When winding your own coils from printed instructions, be careful to note the direction of winding, as if this is not indicated you may fail to get reaction.

* * *

When mounting a valve holder on a metal baseboard do not forget to slip a piece of cardboard or other insulating material under it to prevent accidental shorts, especially if the valve holder has rather long soldering tags.

* * *

The ordinary L.T. battery needs recharging about once every two months whether it is being used or not.

* * *

If you live in the country, where battery charging presents difficulties, remember that special mass type low-tension batteries are made for the convenience of listeners who cannot arrange for their batteries to be charged at frequent intervals.

* * *

As soon as an L.T. battery is run down it should be taken to the service station and recharged.

* * *

The specific gravity of the acid in an accumulator when tested by a hydrometer affords just as good a check on maintenance as its voltage.

A TALK WITH A CZECH LISTENER

(*Continued from previous page.*)

"Mind you, all these outside broadcasts are under the strict control of the station authorities. An official, M. Kares, controls the whole of the non-musical programmes side, whether outside broadcasts or studio items.

"All talks and news bulletins are controlled by a section known as the Radio Journal. This has no connection with the news bulletins, and *journal parlé* given from French stations!

"Our Czech Radio Journal is a section of the broadcasting department having control of all non-entertainment material. The Radio Journal works in cooperation with the leading news agencies.

Very Little News.

"Not a great deal of current news is given. The Journal people arrange for well-known business and sporting folk to come to the microphone and talk about the week's programme."

"We often hear English announcements at Prague. Why is that?"

"If you glance down the programme lists you will see a fair amount of time is devoted to English, French and German lessons on the wireless. This is because the modern trend among young Czechs is to get out of the country, so soon as their education is complete!

"They realise that the country is mainly agricultural and that in manufacturing and art the best work is to be found in England, France and, until recently, Germany.

"Young children in Czecho-Slovakian schools are taught English. It is difficult for us to speak your language, as Czech is quite unlike Latin or Teutonic languages, but is more like Russian and Polish. Incidentally, Russian *patois* is understandable to our peasant Czechs, and that is why many radio relays are made of Russian-station programmes.

"The station calls from, say, Prague, are difficult for you British listeners to follow? It is so difficult to give the exact phonetic pronunciation.

"Prague is spelled and pronounced *Praha*, and the opening signal is Halo! Radio-Praha vysila!

"After the Radio Journal talk generally given at the end of the evening programme, the quaint old-world closing-down address is 'Radio Journal, Praha, konci vysilani a preje vsem posluchcum doma i za hranicemi prijemnou dobrou noc!'"

Reception Troubles.

"Surely," I asked in conclusion, "the opening of the new Prague station has cured most reception troubles?"

"Well," he explained, "at present some listeners in the Prague district are having troubles like those I heard about when your new B.B.C. stations opened! It is all a fight between owners of small crystal sets who want high power, and valve set owners who want alternative programmes and better quality.

"At the moment the Liblice station works from 2.25 p.m. onwards, the Strasnice station only in the mornings.

"The Radio Journal people want to work Liblice on 488·6 metres, and Strasnice on 250."

THE PRIDE OF BRATISLAVA

This is a general view of the Czecho-Slovakian station at Bratislava, which works on 279 metres.

ED. NOTE.—The next talk in this series will be: "A Chat with a Yugo-Slavian Listener."

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.

AN indication of the excellence of long-distance reception conditions at the present time is to be found in the fact that it is still possible to receive American medium-wave stations on nights that are free from atmospherics.

And, luckily, the nights when atmospherics are about are very much in the minority. I don't remember a year in which the American medium-wavers have been well received so far into the spring as this.

You have, though, to try for them rather later than was the case some weeks ago. The time in the eastern states of America is five hours behind our own, and good results are not to be expected unless you wait until an hour when it will be dark over there. Conditions, as a rule, are at their best about an hour or a little more after darkness has set in in the United States.

Listening to Americans.

This means that you can hardly expect to hear much unless you are prepared to sit up until between one and two o'clock in the morning. If, though, you happen to be up at that time, you may be surprised to find how many U.S.A. stations are to be heard.

On our own side of the herring-pond long-distance conditions remain little short of marvellous. All of the long-wave stations are coming through with tremendous strength and, provided that it is working, you can tune in almost any one that you want, in daylight or in darkness, with just about the same certainty that you feel when going for your local station.

Interference Troubles.

The number of well-received stations on the medium wave-band shows few, if any, signs of a decrease. There are a certain number of heterodynes, but, luckily, these affect very few of the stations that are really worth hearing.

Almost the only sufferers of note are Bordeaux and Beromunster. The Swiss station is not by any means always heterodyned or jammed, and when you find him clear he comes in splendidly. Bordeaux Lafayette, on the other hand, has been practically blotted out night after night for quite a while now.

Spark transmissions continue to be annoying between 220 and 270 metres, and it is really time that an end was put to a form of interference which is quite unjustifiable in the present year of grace. The spark transmitter is almost as much out of date as the penny-farthing bicycle or the hansom cab.

A Score of Good Stations.

The pick of the medium-wave stations are Turin (extraordinarily good), Heilsberg, Bratislava, Hilversum (at all hours), Genoa, Goteborg, Lwow, Toulouse (good in the afternoons as well as in the evenings), Frankfurt, Katowice, Hamburg, Strasbourg (much improved of late), Breslau, Milan, Brno, Stockholm, Rome, Langenberg, Prague and Brussels No. 1. A pretty useful score in both senses of the word.

In addition, there are many other stations which are well worth attention. I do not include them in the star list, because they are apt to vary in volume.

SHORT-WAVE NOTES

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

By W. L. S.

READERS who have never had queer experiences of freak reception due to their particular locality are, I know, inclined to take some of my remarks on that subject "cum grano salis." Even I, myself, can hardly believe some of the freaks that come my way, and I'm told that I am gullible enough! And here is a particularly interesting case.

F.N.B., of Hale, who won the "Amateur" section of our last competition, tells me that he has spent many hours vainly trying to find Sydney, V K 2 M E, but has never yet heard him! And yet he receives Australian amateurs galore whenever they are coming through, even on telephony.

Stations Readers Mention.

He also mentions that the theory that used to be held—that signals "bunched together" at the Antipodes—seems to be discounted by the comparative difficulty in finding New Zealanders at the present time. When they do come over, as he says, they are generally strong, but for long periods it is impossible to find them at all.

There is a whole bundle of correspondence in my basket on the subject of E A Q, Madrid. A summary of it seems to prove that this station is working on 30·5 metres during fairly long periods, not merely between 8.15 and 8.45 p.m., as the "book of words" tells us.

Others mention Poznan, on 31·35 metres, and Bandoeng, on 31·86 metres, as good signals just recently. The "star turn" continues to be Rome, on 25·4: he still appears to work on his 80-metre wave occasionally, but not often.

I am becoming quite embarrassed by letters arriving with wild speculations about my real identity! Although it does not need a Sherlock Holmes to discover it from "P.W.," very few have really tracked me. The first was a neighbour of our friend C T 1 A A—D. V. R., of Lisbon.

Has anyone, other than R. C. F. (Woldingham), heard a station announcing himself as "Bagdad" on 49 metres? He was heard from 17.40 to 18.40 giving news, including the Irish Sweep draw, and gramophone records. R. C. F. has also logged Y I D, Basrah.

My "Peculiar Statements."

W. S., of Leeds, takes me to task for my "peculiar statements" about W 2 X A D, particularly my prophecy that he should soon be a good signal as late as 11 p.m. W. S. finds that the station does not transmit at that hour, and quite rightly surmises that, in that case, we shouldn't hear him! I can't quibble with that, but I *have* noticed that W 2 X A D is often to be heard at wonderful strengths when, according to his schedule, he had no business on the air at all.

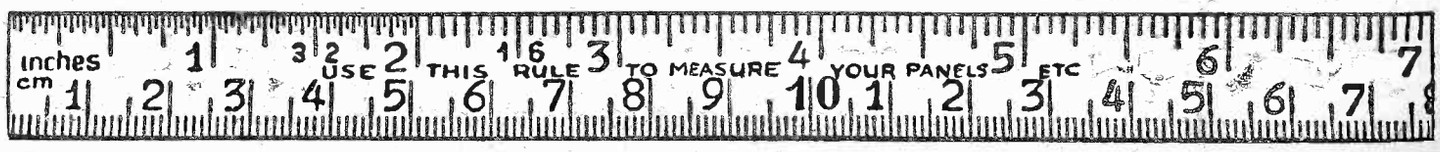
Also—W. S. and others please note—the schedule is frequently changed, and at this time last year he was on the air regularly up to 11 p.m. (G.M.T.). By the time you read this, I shall be surprised if that is not once more the case.

I have had an interesting budget from Mr. Roy Perkin, of Z S 2 L (Port Elizabeth), giving me details of his short-wave receiver, which he backs to beat any that we have ever published over here. It comprises a screened-grid detector, resistance-coupled to the first L.F., which is transformer-coupled to an optional second L.F.

S.G.'s for Short Waves.

I can't see much difference between the first part of the set and my own "two" that appeared in the January issue of "M.W.," but it is run completely from A.C., and therefore makes use of the excellent characteristics of indirectly-heated valves. Thanks very much, R. P.

Several queries from readers about the difficulty of making a screened-grid stage work really well on short waves have impelled me to write a separate article on that subject, my weekly space being too small to allow me to do justice to it. Suffice it to say that two friends—one a member of the "P.W." staff who used to be dead against S.G. for short waves—are now quite converted.



ALL PRINCIPAL CIRCUITS
Including the 'Cosmic III' and the 'Eckersley A.C.2'
feature R.I. COMPONENTS

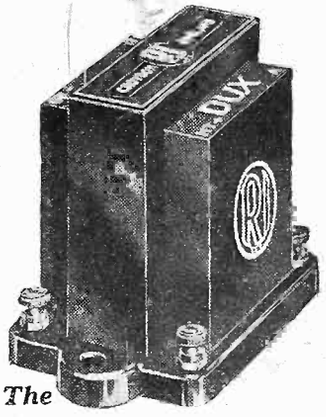
The problems of selectivity and sensitivity plus modern economical considerations demand a finesse in component design and efficiency which R.I. have long foreseen and provided for in components that are always consistent with, and often ahead of, latest developments in modern radio.

R.I. COSMIC COIL UNIT

The R.I. Cosmic Coil Unit is specified for the "Cosmic" III because of the distinctive and exclusive advantages that it possesses. It combines in one complete unit coils for long, medium and short waves, ensuring easiest fixing and most compact set assembly. A fact of paramount importance is the skeleton construction of the short-wave coil former, which reduces dielectric losses to a minimum—a vital point in this circuit. Every individual coil is carefully tested, before release, on the "Cosmic" III circuit, and checked with a wavemeter over the entire range of broadcast and short-wave bands .. .. .. *List No. BY 31* **12/6**

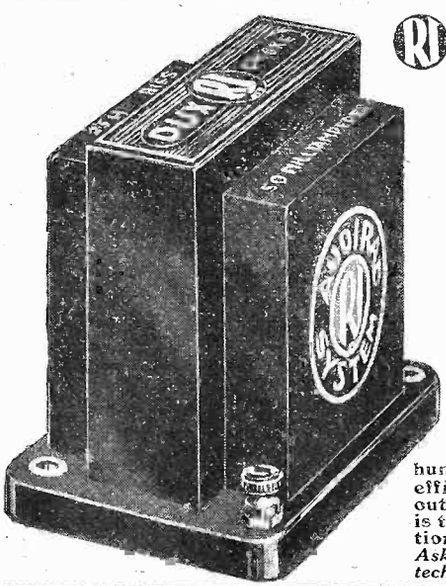
The
DUAL ASTATIC CHOKE
Specified for "Cosmic" III

Remarkably efficient on the short waves as well as the medium and long waves this is the only choke that cuts out all blind spots and resonant losses—an important feature for short wave work. Its skeleton form of construction and astatic winding ensure freedom from H.F. interference with adjacent components. **7/6**
List No. F.Y.1



The
"DUX" Transformer
Specified for "Cosmic" III

This remarkable Transformer has attained enormous popularity by unequalled performance in hundreds of thousands of sets, and is the designers' first selection for the "Cosmic" III, because it is without doubt the lowest priced transformer that is really efficient and which gives the good L.F. amplification, so vital a feature in the circuit. **6/9**
Inductance 30 henries. List No. DY 29.



R.I. ECKERSLEY TUNER
For the "Eckersley A.C.2."

R.I. produced the original model of Capt. Eckersley's amazing Tuner in strictest accordance with the inventor's specification and have improved the details of construction to a pitch of accuracy that determines the greatest degree of selectivity with sensitivity. Every individual model is subjected to exacting laboratory tests before release .. **15/6**

The original model built for Captain Eckersley — improved and perfected.

"DUX" AUDIRAD CHOKE
Specified for the "Eckersley A.C.2,"

A new form of choke dealing with low frequencies and high frequencies by means of a unique stopping device which bars H.F. currents that would normally be passed by the self capacity of an ordinary L.F. choke, and cause hum and other H.F. interference. Its super-efficiency for smoothing or output filtering in A.C. circuits is the reason for its specification in the "Eckersley A.C.2." **8/9**
Ask for the Dux Audirad leaflet giving full technical information and diagrams.

The R.I. 1932 Catalogue is now ready. Ask for a copy.

Advt. of Radio Instruments, Ltd., Croydon Surrey. 'Phone: Thornton Heath 3211. T.A.

MIRROR OF THE B.B.C. By O.H.M.

THE OPERA MUDDLE

THE CHILDREN'S HOUR—NEW IDEAS IN PRESENTATION, etc.

THAT we are to have even an attenuated opera season in London is due principally to the patience and businesslike qualities of Sir John Reith, who, I understand, was responsible for rescuing the situation when it was despaired of by the Opera Syndicate.

Sir Thomas Beecham conducting four weeks of Wagner is a proposition certain to pay, so there is no question of more subsidies or disproportionate payments from broadcasting funds. So far so good, but it seems to me that the whole affair should be cleaned up for good.

First of all, the wretched word "subsidy" should be dropped, and the B.B.C. could hasten its obsequies by coming out boldly and accepting responsibility for opera within reasonable limits, just as it has accepted complete responsibility for Empire broadcasting.

If this course is followed there would be removed at once a constant source of Parliamentary irritation. There is pretty general confidence in the use which the B.B.C. makes of its financial resources. Sir John would soon put opera on a sound basis of organisation and finance.

The Children's Hour.

I was the first to advocate publicly the appointment of Mr. John Kettelwell to the vacant post of head of the Children's Hour at headquarters, hence I take unusual pleasure in the fulfilment of this aspiration. New blood was badly wanted in the B.B.C., and just this kind of new blood—versatile, original, cultivated, and idealistic.

I look to Mr. Kettelwell to make a really fine thing of the Children's Hour. He is fortunate, of course, in having as his "right hand" Captain Derek McCulloch, the far-famed "Uncle Mac," who, by the way, has just become a proud father. Good luck to the new partnership in all their enterprises.

New Ideas in Presentation.

Mr. Lance Sieveking's new musical fantasy, which he calls "Arrest in Africa," is to be produced in the National and Regional programmes on Friday and Saturday, April 15th and 16th, and from what I hear the piece is already exciting considerable interest at Savoy Hill.

Mr. Sieveking has been responsible for some unusual programmes in the past, as is only to be expected from a man whose ability has brought him the special privilege of devising and trying out new ideas in the presentation and development of radio drama.

But in "Arrest in Africa" Mr. Sieveking has gone much further than hitherto; he has written the music for ten songs, his first effort in composition. We must expect, therefore, that this fantasy, the story of which is about a village policeman who is sent to the African jungle to "get his man," as told in a series of scenes mixed with songs and sound effects, will be rather original.

There is, however, much more behind Mr. Sieveking's work than meets the ear of the average listener—and after all, big things can only come from experiments.

The Productions Department at B.B.C. headquarters is also busy in other directions, both inside and outside Savoy Hill. I say outside, because Val Gielgud, the Director of Productions, has written "Red Triangle," a drama to be produced in London in the near future.

The play is based upon the story

(*Continued on page* 147.)

FURTHER OUTLOOK—MUD!

This Air Ministry wireless operator is receiving radio reports from abroad, and from the data so collected at headquarters in Kingsway, London, the Weather Report will be prepared. Let's all hope he gets some good ones this year!

SEVENTY STATIONS ON THE "COSMIC"!

The Editor, POPULAR WIRELESS.

Dear Sir,—Although I have built many sets of the straight-3 type, I must say that I have not yet built one to equal the "Cosmic Three," it leaves them miles behind.

I built my "Cosmic" Three about a fortnight ago. The selectivity is remarkable. For instance, I can receive London Regional, Stuttgart and Algiers without any background (thanks to the moderator), Toulouse on 385 m., with HARDLY ANY background of Midland Regional, also Radio Paris with HARDLY ANY background of 5 X X (background is only noticeable during intervals). Hoping this report will be of interest to you.

Yours faithfully,
H. B. BURTON.

"Ivanhoe," Ansty Road, Wyken, Coventry.

P.S.—I have built a second "Cosmic." This one for an uncle, who wishes me to thank you for such a fine set. I also add my thanks.—H. B. B.

SHORT-WAVE STATIONS. (Received to date.)

W 2 X A D (twice on L.S.), 19·56 m.
PARIS (Colonial) on 19·68 AND 25·2 m. (L.S. both).
ROME, 25·4 (L.S.).
CHELMSFORD (G 5 S W), 25·53 (Ph.).
V K 2 M E, Sydney, 31·28 m. received this afternoon. I heard the "Kukka-burra" call very clear.
ZEESEN, 31·38, full (L.S.) strength.
HILVERSUM (L.S.) on 31 m. approx. (relaying football match between Holland and Belgium).
C T 1 A A, Lisbon, testing Tuesday night.
W 2 X A F, 31·48 m. (Ph.).
C T 1 A A, 42·9 m. (L.S.) Friday (Heard Capt. Eckersley and Mr. Kelsey on records).
W 3 X A L, Boundbrook (Ph.).
MOSCOW, 50 m. (L.S.).
VATICAN, 50·26 (Ph. and L.S.).
Also various 'Phone stations.
MEDIUM-WAVES. I have made a log of 41 identified and 3 unidentified stations (by help of World Radio).
LONG WAVES. 12 identified stations.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

LET me put in a good word for "Oranges and Lemons." It was well acted, and the human touch was prominent throughout. The dialogue, too, was good, and a moderate use of effects was very telling.

I am sure there must have been plenty of argument at the family fireside over the closing stage, when the long-suffering daughter of Mrs. James Miller shut the door in the face of her step-father, who had combs, studs, and some oranges to sell. What would you have done?

* * *

Without a doubt "Fun Racketeers" is the proper title of those two clever comedians Haver and Lee. Their humour, always fresh and pungent, seems to bubble from them in some mysterious way that the ether appears only too happy to handle it. Their turn is one that must give rival couples cause to think furiously.

If Ann Penn could only start with a more impressive introduction to her impersonations she would be flawless. The way she takes off some of the big stars is really first-class.

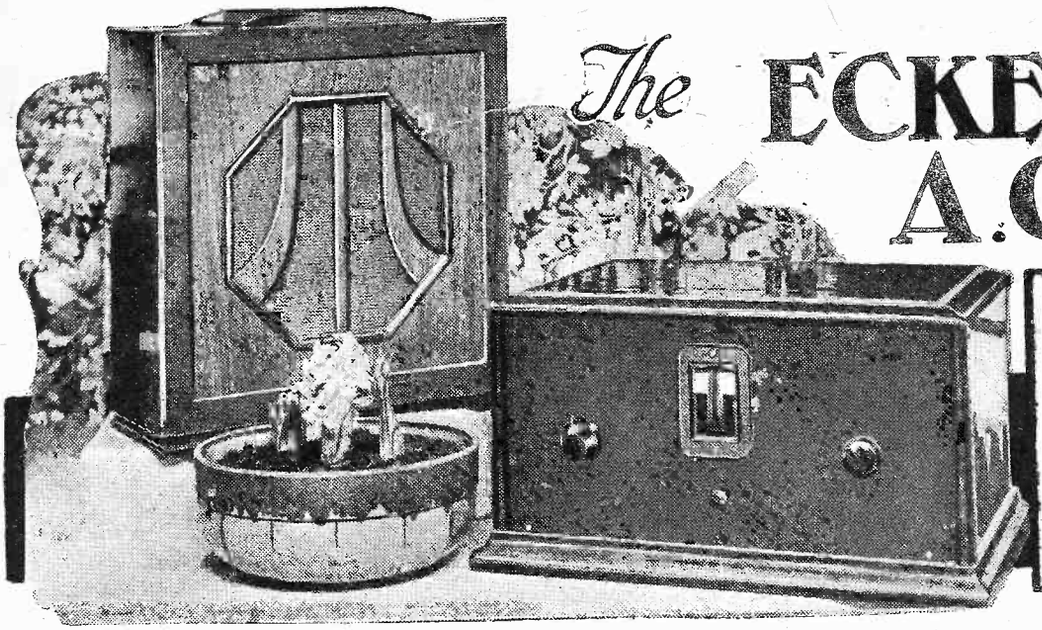
* * *

The Sisters Waters are adding to their reputation. They are two hard-working young artistes, and it was significant that the applause from the studio went on even while the announcer was giving out the next turn. This may be against the etiquette of the studio, but it is sometimes, nevertheless, excusable.

* * *

As one who has listened to solo singing by many choir boys, and who thought the Temple choir boy Lough almost perfect, I do not hesitate to place the Welsh boy singer, Iwan Davies, above them all.

(*Continued on page* 146.)



The ECKERSLEY A.C. TWO

An amazingly simple set without a single complication for running from electric mains. It incorporates that most modern of dual-range coils—the Eckersley Tuner—thus ensuring ample station separating powers.

Designed and Described by the "P.W." RESEARCH DEPT.

"WHAT an engine!" Have you ever heard this exclamation applied to an A.C. mains receiver? It's certainly a quaint way of putting things, but, you will agree, very apt where some such sets are concerned.

In fact, so complicated are many mains receivers, especially commercial ones, that they simply seem to shout, "For experts only!" But is it necessary? Must one have such an "engine" if the many advantages of an all-from-the-mains outfit are to be enjoyed?

By way of answer to our own question we will ask you to take a look at the photos and diagrams of the set illustrated on these pages. It's just as simple as a two-valve battery set, and yet does not use a single dry-cell.

A Dual-Purpose Receiver.

As a matter of fact, by altering a few connections it can be used as an ordinary battery receiver. We'll tell you what the alterations are later on, so that you can use your present batteries and valves for the time being, if you like.

Quite a lot of people with mains use an ordinary battery set and derive the high-tension from a mains unit. If you are one of these and want to go completely over to mains, but at the same time do not want to spend too much in the process, then you want to tackle this "two," for you can use your present mains unit and most likely quite a number of the present components.

The reason is that it is designed for a separate mains unit. But don't think you will be losing any efficiency because of this.

From an all-round efficiency point of view it would be exceedingly difficult to

(*Continued on next page.*)

EVERY COMPONENT USED IN THIS ALL-MAINS SET IS LISTED HERE

1 Panel 14in. × 7 in. (Permcol, Becol, Ready Radio, Peto-Scott, Wearite, Goltone).

1 Cabinet to fit above, with 10-in. baseboard ("Morco," Pickett, Camco, Gilbert, Osborn, Ready Radio, Peto-Scott).

1 Double drum ·0005-mfd. variable condenser (Cyldon "Junilog," Polar, J.B.).

1 ·0005-mfd. solid dielectric condenser, with self-shorting pin (Ready Radio).

1 ·0001-mfd. differential reaction condenser (Telsen, Ready Radio, Polar, J.B., Cyldon, Lotus, Graham Farish, Wavemaster, Dubilier, Ormond, Lissen, Magnum, Formo).

1 ·0003-mfd. fixed condenser (T.C.C., Dubilier, Formo, Ferranti, Ready Radio, Sovereign, Goltone, Graham Farish, Lissen, Telsen).

3 2-mfd. fixed condensers (Telsen and Dubilier, T.C.C., Formo, Ferranti, Sovereign, Hydra, Helsby, Igranic, Lissen).

1 Eckersley Tuner (any good make).

1 H.F. choke (Lewcos type M.C., Telsen, Ready Radio, Peto-Scott, Sovereign, Dubilier, Watmel, Atlas, Tunewell, Formo, Graham Farish, Varley, Lissen, R.I., Wearite).

1 Output choke (R.I. Audirad, Ferranti, Varley, Telsen, Igranic, Graham Farish, Wearite, Magnum, Lotus).

1 2-meg. grid leak (Graham Farish Ohmite, Loewe, Igranic, or the following with holder, Telsen, Ready Radio, Sovereign, Ferranti, Lissen, Varley, Watmel).

1 30-ohm. potentiometer (Claude Lyons "Humdinger").

1 25,000-ohm Spaghetti resistance (Varley, Bulgin, Telsen, Lissen, Sovereign, Lewcos, Graham Farish, Tunewell).

1 350-ohm Spaghetti resistance (see text) (Bulgin, etc.).

1 L.F. medium ratio transformer, (Igranic Midget, Telsen, R.I., Ferranti, Climax, Lewcos, Lotus, Graham Farish, Lissen, Varley, Sovereign, Formo).

2 5-pin valveholders (W.B. small type, Graham Farish, Telsen, Bulgin, Igranic, Lotus, Clix).

1 4-point wave-change switch (Telsen).

1 Terminal strip, 14 in. × 2 in.

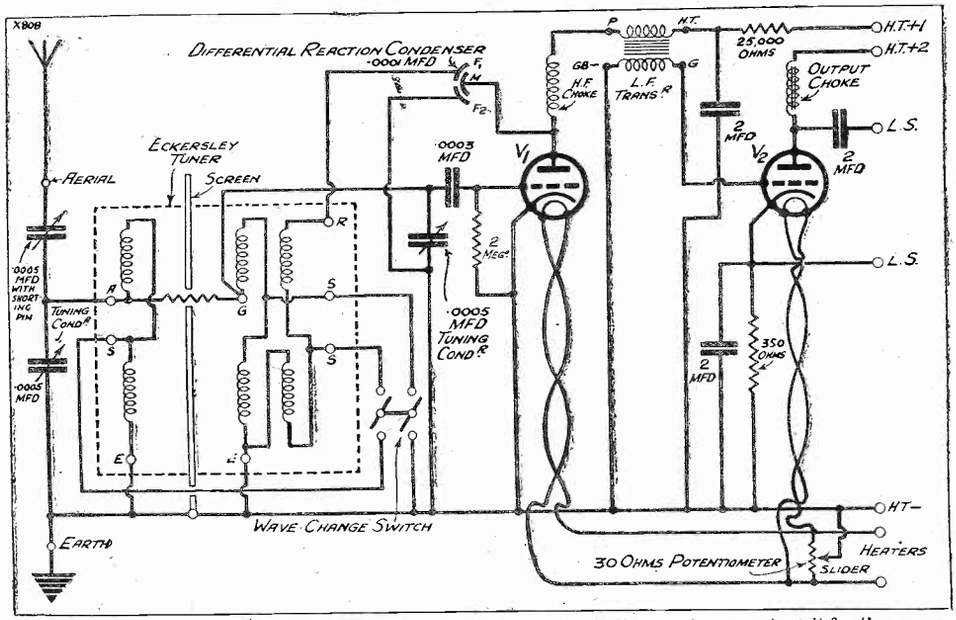
9 Indicating terminals (Igranic, Belling-Lee, Eelex, Clix).

Glazite, Lacoline, Jiffilinx, Quickwyre.

18-in. metal-covered twin flex (Lewcos).

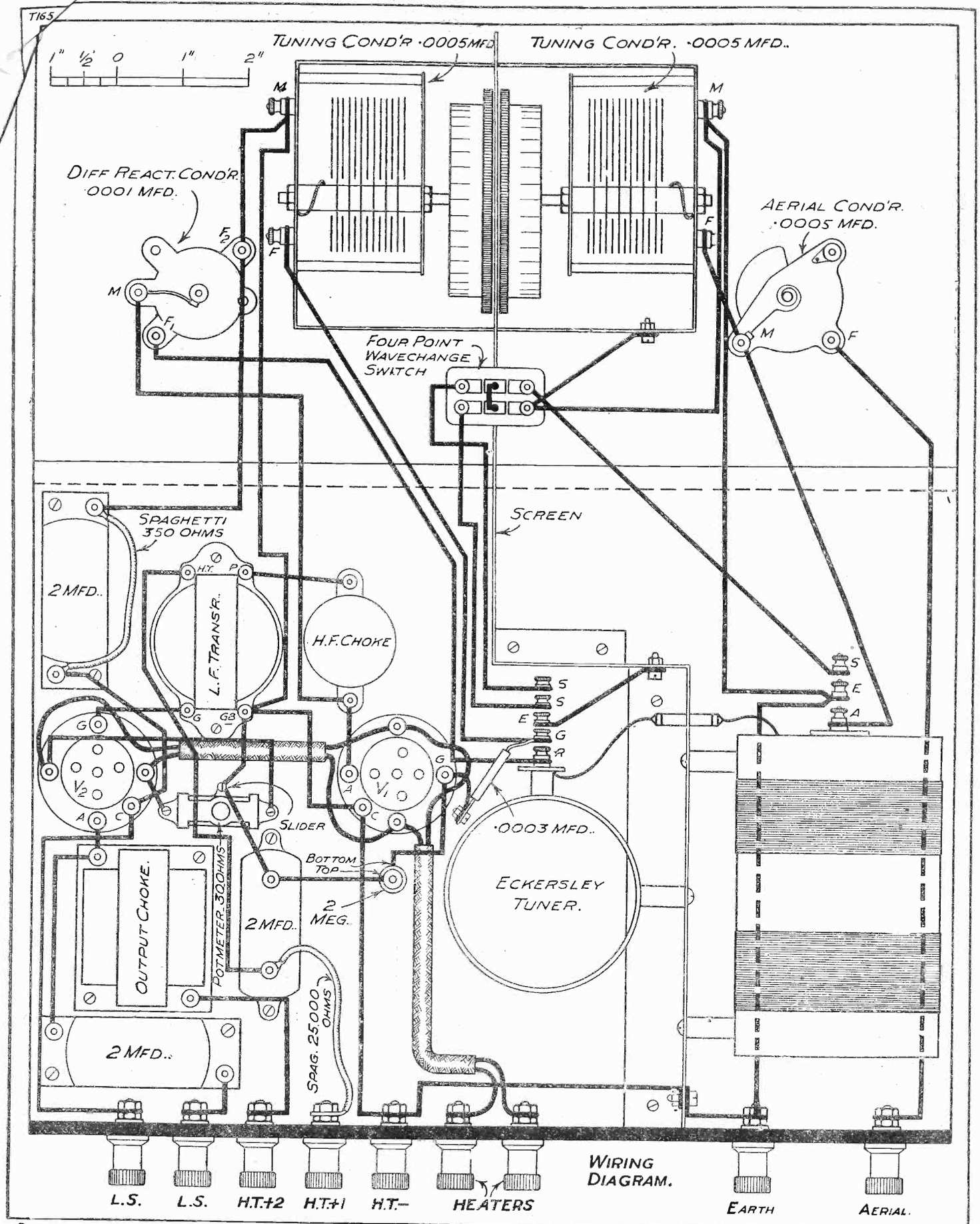
Wire, screws, flex, etc.

AS SIMPLE AS A BATTERY RECEIVER



The simple nature of this all-from-the-mains receiver is largely due to the use of a separate unit for the power supply instead of incorporating all the "mains" components in the receiver proper.

A PERFECTLY SAFE RECEIVER FOR YOUR A.C. MAINS



Once you have assembled and wired the Eckersley Two there is nothing to worry about. There are no accumulators to charge, no high-tension to run down, not even a grid-bias battery to bear in mind. It is always ready at the turn of a switch to provide you with programmes in plenty.

FOUR FINE SETS

Here are four fine sets for you to choose from, each the leader in its class. Any set built with a Ready Radio Kit can be depended upon to give the results the designer claims for it.

COSMIC STAR

The Cosmic Star covers all wavelengths—short, medium and long. It will bring you programmes from America, Australia, Africa and Asia with the same ease with which you tune in a Continental Station.

KIT "A" Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffilinx for easy non-soldering wiring and free blue print. **89/6**

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

KIT "B" £5 : 12 : 3
Complete Kit of Components with valves and free blue print.

KIT "C" £6 : 13 : 3
Complete Kit of Components with valves, beautiful Table Cabinet and free blue print.

OR BY EASY PAYMENTS

10/6 down and **11** monthly payments of **10/6**

12/3 down and **11** monthly payments of **12/3**

S.T.300

The S.T. 300 is the finest screened-grid three ever designed. Its wonderful selectivity, sensitivity and power make station-finding the simplest of matters to the least experienced operator.

KIT "A" £3 : 18 : 6
less valves and cabinet

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

KIT "B" £5 : 10 : 9
With valves less cabinet.

KIT "C" £6 : 9 : 3
With valves and cabinet.

OR BY EASY PAYMENTS

10/3 down and **11** monthly payments of **10/3**

12/- down and **11** monthly payments of **12/-**

TO INLAND CUSTOMERS.—Your goods are dispatched post free or carriage paid.

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

"Popular Wireless" Official Exhibitors sell Ready Radio Kits. Look for the sign in the window.

SINGLE DIAL SUPER

KIT "A" less valves and cabinet **£8 : 18 : 3**

OR BY EASY PAYMENTS
16/6 down and **11** monthly payments of **16/6**

KIT "B" with valves less cabinet **£12 : 7 : 0**

OR BY EASY PAYMENTS
22/9 down and **11** monthly payments of **22/9**

A.C. ECKERSLEY TWO
If you are interested in the A.C. Eckersley Two, write to Ready Radio for details and prices.

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

READY RADIO

Showrooms: 159, Borough High Street, London Bridge, S.E.3. Phone: Hop 3000.

CASH or C.O.D ORDER FORM

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

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

.....

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

Name.....

Address.....

..... P.W. 9/4/32.

EASY PAYMENT ORDER FORM

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

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

.....

for which I enclose first deposit of £.....

Name.....

Address.....

P.W. 9/4/32. .....

THE ECKERSLEY A.C. TWO

(*Continued from page* 132.)

design a more desirable set. Take selectivity for a start.

This is taken care of by an Eckersley Tuner, which at the same time ensures that there will be no shortage of distant programmes. Nor will quality be poor.

The detector valve is coupled to the output valve by a transformer, and there is an output filter, differential reaction, automatic grid-bias and potentiometer control among its many refinements. The potentiometer ensures that the H.T.— shall be connected to the heater transformer in an "accurate" manner, so that hum is avoided.

Special Wave-Change Switch.

The wave-change switch is a little out of the ordinary, so a few words of explanation will be useful. It is in effect two plunger type on-off switches, so connected that one knob controls them both.

The two plungers are wired together, and it is important that this connection is not omitted. When the knob is pushed in the four contacts of the switch are all separated and the set works on long waves, when they are all connected (switch pulled out) the receiver is adjusted for medium waves.

Instead of this particular switch a three-spring wave-change switch could be employed, the fourth contact being obtained by connecting a flex wire to the plunger. Another component point concerns the ·0005-mfd. solid dielectric condenser in the aerial lead.

See that this is one with a shorting position when the moving vanes are all in or all out. If this condenser is not set shorted by this means for long-wave reception, results on this band will be rather poor.

Now a word about the 250-ohm spaghetti resistance that is used to provide the automatic bias for the last valve. This value is suitable for the valve we used in the original set, and mentioned first in the list of accessories, assuming an H.T. voltage around 150.

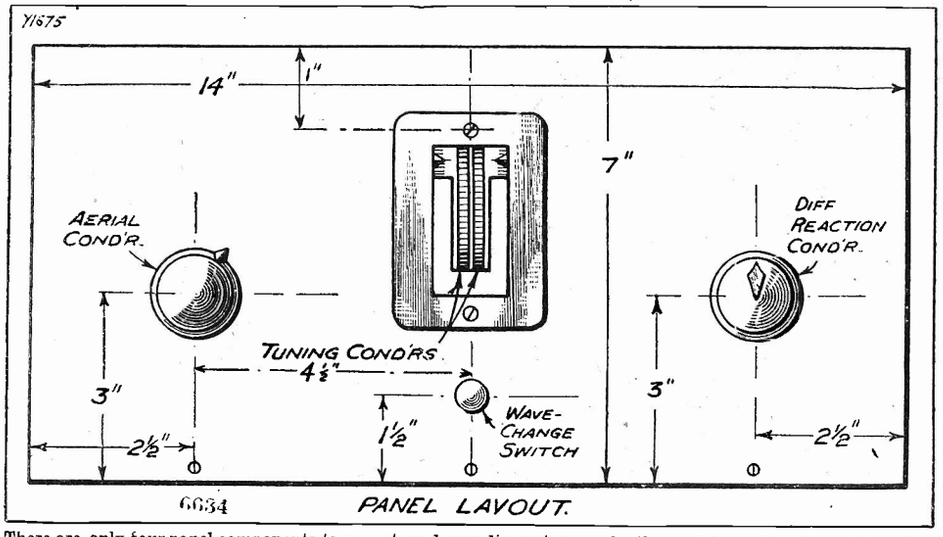
With some of the other valves mentioned as alternatives a different value of resistance is necessary, but the right value is easily worked out in the following manner. First of all get out the maker's curves from the box in which the valve is supplied (it is usual thus to enclose them).

Note the bias required for 150-volts H.T. and pick out the curve taken at this voltage, or the nearest voltage if 150 is not given. Run a pencil along the bottom line till you come to the right G.B. voltage and then work up this line until you reach the point where it crosses the 150-volt curve.

Not Very Difficult.

Here you must work to the left of the chart and read off the current given in milliamps. To find the required value, divide this current in milliamps into the desired G.B. voltage multiplied by 1,000.

DETAILS FOR YOUR RULE AND SCRIBER



There are only four panel components to mount, and easy dimensions make the marking out of the positions for the holes a simple matter. Note that there is no on-off switch, all the "on-offing" being done from the unit.

The main screening is provided by the Eckersley Tuner, but this has to be joined up to the metal plate of the extensers by a small screen bent at right angles. Note also that a small piece is cut out of it to make room for the wave-change switch.

The wire used to connect up the heater terminals of the valve holders to the terminals marked A.C. L.T. is of the type covered with metal braiding. It is usual practice to connect such covering to earth, but we did not find it necessary to do this.

But you might with your mains. So it is as well to use similar wire and earth it if you have any bother from humming or instability.

Next week we will tell you how to connect up to the mains unit, etc., and also give details for using it on batteries.]

ACCESSORIES TO CHOOSE FROM.

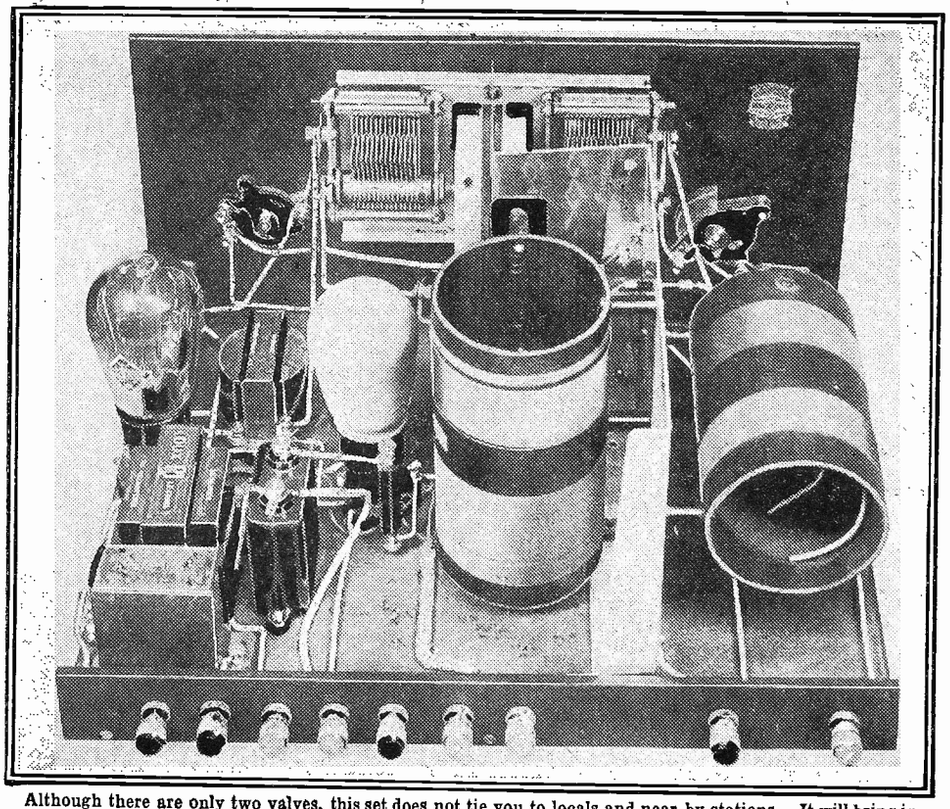
Loudspeaker (Epoch, Marconiphone, Celestion, Graham Farish, W.B., Blue Spot, H.M.V., B.T.-H., R & A).

Valves—1 Det. (Cossor 41M.H.L., Mazda A.C./H.L., Mullard 354V., Marconi M.H.4, Osram M.H.4, Six-Sixty 4D.X.A.C., Eta D.W.4023, Tungsram A.R.495).

1 Output valve (Cossor 41M.P., Mazda A.C.P., Marconi and Osram M.L.4, Six-Sixty 4P.A.C., Mullard 104V., Tungsram A.P.495), Eta D.W.1003).

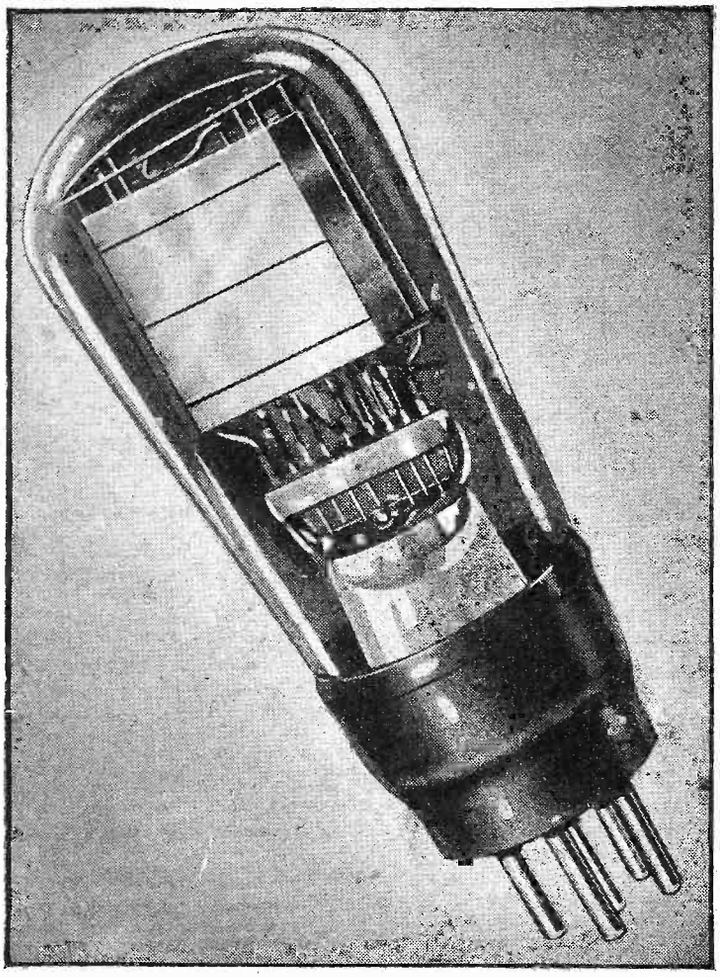
Mains Unit.—To supply 150–200 volts at 30 milliamps, and 2 amps at 4 volts for heaters. It should not have an earthed centre-tap on the heater transformer (Heayberd M.W.1).

FINE RESULTS FROM FOREIGNERS AND LOCALS



Although there are only two valves, this set does not tie you to locals and near-by stations. It will bring in distant transmissions, on the speaker, of course, at good strength, good quality, and free from interference.

THE NEW LOW CONSUMPTION HIGH EFFICIENCY PENTODES



★FOR THE MAN WHO USES BATTERIES

PEN 220

Here is the solution to the output stage problem in battery operated receivers. The Mazda Pen 220 gives an astonishingly high undistorted output for an anode current of only 5 m/a. It is the ideal output valve for portables.

PRICE 17/6

★FOR THE MAN WHO HAS AN ELIMINATOR

PEN 220A

A valve which delivers a huge undistorted power output for an anode current of not more than 18 m/a, the Pen 220A needs only 150 volts on the anode and can be made to give excellent results with 120 volts and a current of only 12 m/a. It is undoubtedly the valve for the man who wants really magnificent volume for the operation of large moving coil speakers.

PRICE 17/6

Mazda Valves are 100% British made and designed by British engineers.

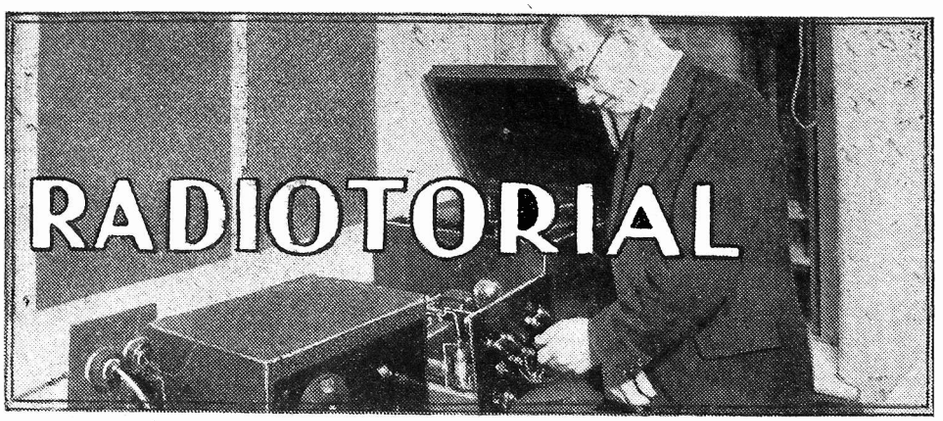
The amazing

MAZDA
THE BRITISH VALVES

EDISWAN RADIO

The Edison Swan Electric Co. Ltd. (AEI Associated Electrical Industries Ltd.) 155 Charing Cross Rd., London, W.C.2

V.147



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

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

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

QUESTIONS AND ANSWERS

AN AMPLIFIER FOR GRAMOPHONE WORK.

F. B. (Mountain Ash).—"Is it possible to use a single-valve amplifier for gramophone pick-up work without altering the wiring of the main set? In case that is not clear, I mean can an amplifier be used to boost up the pick-up before this is connected to the set?

"I find the pick-up I have tried is not quite strong enough to bring out the full tone on dance records, but I do not want to run the extra valve for radio in the ordinary way.

"If you have ever put out an amplifier of this kind, will you please give publication date. Or failing that, can you supply a description of connections?"

It is quite possible to do as you wish, but you might not find it easy to work out a satisfactory layout, etc., from a brief description. So we think your best plan is to get details of the very similar and suitable arrangement recently described in "The Wireless Constructor."

This was called the "Uni-Amp," and takes the form of a compact unit, with flexible leads like an "Antipodes Adaptor." It embodies volume control, and is just the thing for your purpose, and it can also be used as a straight amplifier for a valve set. (Full details appear in the April number of "The Wireless Constructor," now on sale, price 6d.)

HOW ARE YOUR RESULTS NOW?

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

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

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

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

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

OSCILLATOR WINDINGS FOR "SINGLE-DIAL SUPER."

The gauge of wire for winding the oscillator unit of the "P.W." "Single-Dial Super" is No. 30 D.S.C. throughout. Diagrams of this unit were given on page 76 of the March 26th issue, and the numbers of turns are as follows:

Long-Wave Anode Winding	74 turns	At top of former
,, ,, Grid ,,	40 turns	
Medium-Wave Anode Winding	34 turns	
,, ,, Grid ,,	15 turns.	

Both rotors have 20 turns in all, 10 to each slot. (Note: The direction of winding is marked on the diagrams mentioned.)

HUM ON SHORT-WAVES.

F. A. (Reading).—"While talking over with some friends the best circuit arrangement for a new set I was thinking of, I learned to my astonishment that the general opinion appeared to be that whereas with my mains set which gives no hum whatever on ordinary wavelengths (that is the 250 to 600 band, and on the long-waves, 1,000 to 2,000 metres) I was likely to find trouble when I went to very short-waves.

"None of them could explain why that should be so, but they all seemed very emphatic about it. I should like to know if it is a matter of common experience and, if so, how it can be accounted for?

"It seems to me that on short-wave work with the very high frequencies involved one would be much farther away from the sort of frequencies that would be troublesome when introduced by the mains, so I should be glad of an impartial opinion and if possible, some explanation."

Your friends were quite right, and it is commonly found that mains apparatus which is perfectly satisfactory on both ordinary wavebands, can and does introduce very objectionable hum when used for short-wave sets. That is the reason why you so seldom see a set using mains valves employed on short-waves, and why so many short-wave enthusiasts, who run their ordinary broadcast reception sets from the mains, keep an accumulator and H.T. battery especially for short-wave work.

Although the frequencies introduced by mains apparatus are comparatively low, and those used in short-wave working are enormously high, it must be remembered that a short-wave set is usually worked in its most sensitive condition right on the edge of oscillation. And also that the signals coming into a short-wave set are often very weak when compared with those normally dealt with on ordinary broadcast wave-bands. As a result of both these factors hum is far more troublesome on the mains set than on the ordinary set when using short-waves.

It is a matter of common experience, when listening to ordinary broadcasting, to find that a slight hum, which is hardly audible when no programme is being received, is quite *un*noticeable when the set is tuned in to the local station. In other words, the programme-level is very high compared with the interference level, and under normal working conditions the latter is unnoticeable.

If the set were used for very *weak* signals, however, at a strength level equal to or even less than the hum level, the hum would become correspondingly troublesome.

H.T. BATTERY RUNNING DOWN TOO QUICKLY.

W. M. (Welshpool).—"Although the time varied within a few weeks, I used to find that a double-capacity battery lasted the set just about four months, and it was nearly always necessary to treat myself to a third one before Christmas! In fact, I had got accustomed to thinking of the expense of a battery once every four months as the proper thing.

"But at the beginning of last December I found that the one I was using seemed very low and I got another one. (Beginning of December.) Instead of that lasting until about now, as I had hoped, I found I needed another one three or four weeks after Christmas.

"I was a bit sore at having to buy one so quickly, but I thought I had been unlucky and got a dud, and must not grumble too much, so I got another kind, British make. And behold, exactly the same trouble has arisen, and now at the end of another two months I am down again!

"Nothing in the set has been touched at all, and when the batteries are new it sounds perfect. Do you think it can be the 18-months-old valves causing the trouble, or what is likely to be upsetting it in this way?

"I have got the new battery in, and it sounds perfect, but all the time I am afraid it is running down like the other two. Would it be an advantage to pull out the H.T. negative plug when the set is switched off?"

It certainly looks as though the insulation somewhere in the set has broken down and is wastefully emptying the battery even when the set is supposed to be off. And as the best rough-and-ready method of preventing this waste of H.T. is to remove the H.T. negative plug from the battery when the set is not working, we certainly recommend that you should do this. Even more important, and to counteract the leak during the time that the set is on, is to find it and replace the dud part, as this may get worse and is certainly doing no good when the set is switched on, whatever may be the case when the plug is removed after the programme has closed.

The best way to trace such a fault is by means of a milliammeter, which should be connected in the H.T. negative lead. It should, of course, be of such a type that it will read the total current of the set.

(*Continued on page* 138.)

TECHNICAL TWISTERS

No. 108—THE BAFFLE-BOARD.

CAN YOU FILL IN THE MISSING LETTERS?

The effect of a baffle-board is to increase the effectiveness of the cone in regard to . . . . response.

* * *

Unless such a precaution is taken the displacements of . . . by one surface of the diaphragm tend to interfere with or cancel the effect of the displacements caused by the other surface, and the resulting sound wave is not a true copy of the original.

* * *

The chief practical effect of providing a suitable baffle-board is an improvement in the . . . notes.

* * *

It is important to use a . . . . . board.

Last week's missing words (in order) were: Emission. Grid Bias. Current.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 136.)

Possibly you can borrow some such instrument from a knowledgeable acquaintance who will connect it up for you, the usual method of testing being as follows:

With the filament switch off and with the milliammeter in the negative lead of the battery, there should be no current flow at all even when the battery plugs are at maximum. If a small steady current *is* observed this is a certain indication that the set has sprung a leak and you must immediately find it.

You can soon tell whereabouts the fault lies by removing, one at a time, the valves from their holders, the coils from their sockets, etc. and, of course, when one such change results in the milliammeter needle dropping back to zero, you know that you have interrupted the circuit where the leak is.

If there is still a leak when everything that is ordinarily removable from the set has been removed, you will have to try disconnecting the fixed condensers, especially those used for bypassing, which are the most likely cause of such a trouble. Undo one terminal of each condenser until you get on the track of the leak.

It requires a little patience, and really the job should be done by someone who knows his way about the inside of a circuit such as you are using, because it is very easy for anyone inexperienced to cross the wires during this operation, which might result in an expensive burn-out.

If care is taken, however, the probability is that the first few tests will disclose whereabouts the fault lies, and you will immediately be able to localise this still further, so that only two or three changes are invoived before you have discovered where the leakage lies.

Once you have seen how handy a milliammeter can be in this way the probability is that you will not rest until you have got one for yourself, and, as your own experience shows, it is not altogether a luxury, for it may easily save its own cost in upkeep efficiency.

Naturally we assumed you have recently bought a new G.B. battery.

FINDING THE POLARITY.

T. D. (Leyton).—"Could you tell me of any very simple and safe method of telling which is the positive main, and which is the negative in a house wired for D.C.? I have been told that a piece of raw potato will enable this to be done, but my informant was in the dark as to the method except that he was sure the ends of the wire were stuck into the raw potato.

"If this is so, I should like to know what happens to indicate positive, and of any similar methods that may be used without expensive apparatus?"

The raw potato method is quite a good one, but like all methods for finding polarity it must be tackled carefully and by someone who understands the peculiarities and dangers of electric light mains. The electric light companies have the strongest objection to unqualified persons interfering with the wiring.

With all such testing methods, it is usual to insert a lamp of the type used for lighting in series with one of the leads, so that even should a short occur the current is strictly limited.

The method of using the raw potato is to slice it so as to show a clean surface, push one bared wire down into this, and hold it fast, and then place the other bared wire quite near on the surface, or embed it in the clean surface of the potato.

If the wire used is ordinary copper wire a green tint will appear at one of the wires, and this is the one that is connected to the positive poles of the mains. An additional indication is afforded by the fact that a froth or a series of bubbles tends to collect at the negative pole.

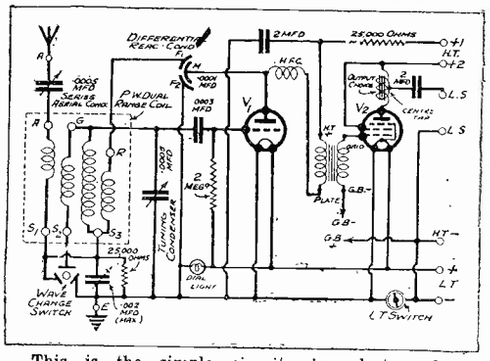
Alternatively pole-finding paper may be employed for the test, the colour of this being altered at one pole when the two wires are placed on the paper. As different pole-finding papers are available, giving different reactions, it is necessary to find out exactly what change will occur when procuring the paper in question.

Another very common and easily-applied test is to dip the bare ends of the wires into a tumbler containing a little water to which a teaspoonful of salt or vinegar has been added. In this case, it will be found that one of the wires bubbles very freely indeed, which is an indication that this wire is connected to the *negative* of the supply.

There are other simple tests commonly and satisfactorily employed, but the foregoing are so readily used that to give more details would be confusing and unnecessary.

MISSING LINKS, No. 31

DETECTOR AND PENTODE



This is the simple circuit given last week, with the three "missing" components inserted. It will be seen that these were all condensers—a 2-mfd. for decoupling, a '0003-mfd. grid condenser, and a 2-mfd. for the output circuit.

"P.W." PANEL, No. 66. ABOUT MAINS UNITS.

The chief advantage of an H.T. mains unit is its constancy—it never "runs down." It also has the advantage of very low running cost, though initially it is more expensive than a battery.

* * *

Unlike the battery, it has a high internal resistance and consequently its voltage drops appreciably when large currents are delivered.

* * *

Owing to its high internal resistance a mains unit is less likely to burn out valves through a short, than an H.T. battery.

WERE YOU BORED BY THAT VAUDEVILLE CRITIC?

A review of the B.B.C's. recent Saturday night experiment in which a well-known critic was invited to discuss the variety programmes of the week.

"YOU'VE always been a fairly warm supporter of the B.B.C.," said my friend. "But what did you make of this vaudeville critic of theirs? I'm hanged if I can see what use he was to anybody." There must be many a listener who has asked himself a similar question.

What exactly is the function and value of the vaudeville critic?

To ask this question is to ask what is the value of any criticism of any public entertainment. The answer seems fairly obvious.

What We Expect.

There are three things which the public legitimately expects from a critic. We want our attention drawn in advance to anything which is particularly good of its kind, so that we are not in danger of missing it. We want to know what is really bad so as to be able to avoid it. And we like to think that the critic is doing what he can to encourage new talent where he finds it, so that new stars will be forthcoming as the old ones drop out.

Now let us consider a vaudeville critic in the light of these expectations, and we shall find that by the very nature of his task he is precluded from performing any of these functions *of* criticism properly. This explains why my friend, and thousands more like him, were impatient about a vaudeville critic, who must of necessity fail, however hard he tries, to be of assistance to the great body of listeners.

I said that we expect a critic to draw our attention in advance to anything which may be particularly good of its kind. This is what the dramatic critic of a daily newspaper does for us in his reviews of current plays.

But a poor vaudeville critic is handicapped from the start. As a basis for deciding whether or not we will listen to a given programme his views are useless, for the very good reason that his criticism is given after one or two performances which are rarely repeated!

A Parallel Case.

As a guide to the listener, his views are about as useful as an out-of-date time-table to a man who wants to choose the best train from London to Liverpool! To appreciate how entirely futile his recommendations are, we have only to imagine a newspaper which instructed its critics not to say anything about a stage play until the end of its run.

So it amounts to this. If you have not listened to the week's vaudeville, you find the remarks of the vaudeville critic merely a great bore. And if you do happen to have listened to the week's programmes, the only "kick" you are likely to get from his remarks is the mild satisfaction of seeing how far his opinion of the various artistes coincides with your own!

Nor is the fact that the critic is employed by the B.B.C. altogether a satisfactory arrangement. This reminds me of the second function of criticism—pointing out what is really bad, so that we shall be able to avoid it in the future.

Independent Opinion Preferred.

If you were a vaudeville critic, employed by the B.B.C. to talk about artistes who had already been approved by that august body, would you feel able unmercifully to slate anyone in whom your employers had already shown a certain confidence? Would you not be tempted to praise where you could, and preserve a discreet silence in the case of really bad turns?

A vaudeville critic may honestly try to slate what he thinks bad, but he will never entirely get over this. Instinctively we prefer to rely on definitely independent opinion—newspaper critics, for example, who clearly have no axe to grind.

Nor is a vaudeville critic very helpful in the matter of discovering new talent, for

(*Continued on page* 142.)

PERTRIX

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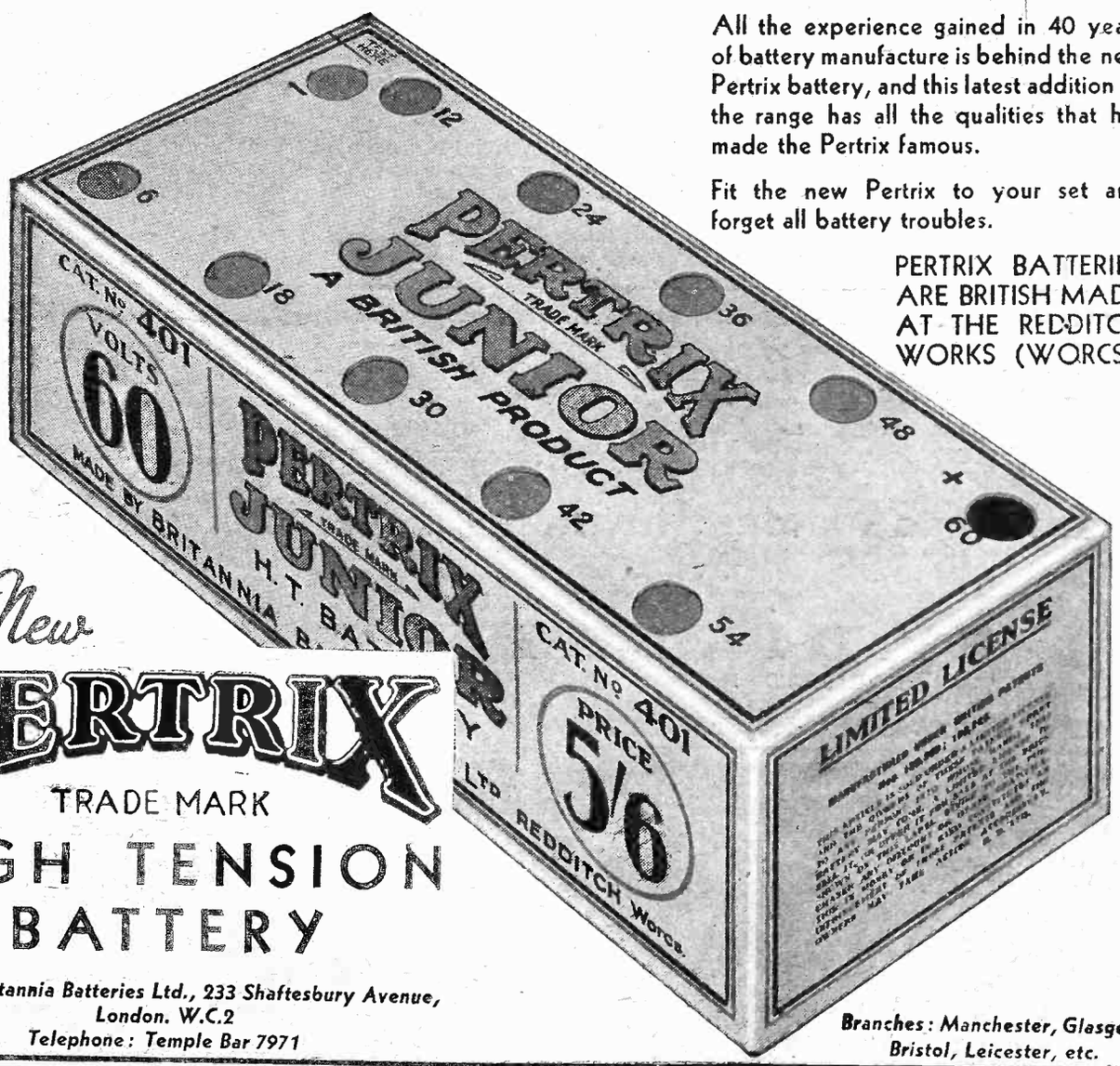

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CVS—13

WERE YOU BORED BY THAT VAUDEVILLE CRITIC?

(*Continued from page 140.*)

the B.B.C. does this effectively, first sifting the sheep from the goats, and then letting the public decide for itself.

The emergence of so many radio stars—Leonard Henry, Christopher Stone, Tommy Handley, Stainless Stephen, A. J. Alan, and many others—without the assistance of official critics indicates that the public is quite capable of making its own radio stars.

Perhaps the whole trouble is that radio criticism in general is unnecessary because radio entertainment is itself so cheap.

After all, the real raison d'être of the dramatic critic is that most people cannot afford to discover what plays they like by a process of trial and error, and depend on the critic to show how best they may lay out whatever money they have to spend on the theatre.

Dramatic Critics.

Playgoers, through the high costs of seats, cannot afford to visit six likely shows in the hopes of finding two about which they can rave—much as they would like to. But this consideration of cost is one that does not arise in broadcasting. The cost is the same, no matter how often you listen!

So that it is easy for the listener to become his own critic. A visit to the theatre is an important occasion and the show we shall honour with our patronage a matter for long and earnest debate, simply because the theatre is expensive. Listening, on the other hand, is cheap, and if we do happen to start listening to the wrong thing, it is so easy to switch off! No inconvenience; no waste of time or money.

Plenty of Reasons.

On the whole, therefore, there seems an abundance of reasons to account for the failure of radio criticism as we know it at present. I refer particularly to the vaudeville criticism, of course, as this is what interests the bulk of listeners. Obviously, the advance talks on forthcoming symphony concerts and so on have their uses, but these appeal to a very limited section of listeners.

My friend who criticised the vaudeville critic so unmercifully admitted later that the various men who undertook the job were amusing in themselves. But this is surely small compensation for their inevitable failure as critics.

RADIO WRINKLES.

Some Aids to Better Reception.

If you have a milliammeter it is a good plan to connect it occasionally in the H.T.+ lead, and note whether you get a reading when the set is switched off. If this occurs, one of your condensers or similar component has its insulation broken down and needs replacing.

Large condensers of the metal enclosed type need not always be thrown away even when faulty, as if they are opened up it may be found they consist of several 1-mfd. units only one of which is faulty.

* * *

It is not a good plan to solder a grid leak direct to the wiring of a short-wave set, with the idea of shortening the leads, as the heat applied to the end of a leak will often seriously upset its working.

NEXT WEEK

A TALK WITH A YUGO-SLAVIAN LISTENER

THESE RADIO COMPONENTS——

THE COMMENCEMENT OF AN IMPORTANT NEW SERIES OF ARTICLES BY CAPT. P. P. ECKERSLEY

TECHNICAL NOTES

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

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

S.G.'s and Grid Current.

THERE is a good deal of difference between different screened-grid H.F. amplifying valves as regards the amount of grid current passed. Often enough these stages are used without any grid bias, and so it becomes an important question how much grid current the valve will pass with zero grid bias.

As I say, some valves pass a good deal more current than others in these circumstances and naturally it would seem better, other things being equal, to choose a valve in which the grid current at zero grid bias was relatively small. You can investigate this roughly by trying two or three different valves alternately in the same position, when you will probably find that their characteristics are noticeably different.

In such a case it is quite possible that the grid current characteristic mentioned above is mainly responsible for the differences. For one thing, if you are using a valve which passes a relatively heavy grid current at zero bias, this will have a broadening effect upon the tuning and the circuit generally will not be so lively.

Small Bias.

If, on the other hand, a small amount of grid bias is used, the natural or inherent differences in the valve will not appear so marked. In fact, you will sometimes find that of two valves, curiously enough, the one which passes the greater grid current at zero bias will actually give the better results when the proper amount of grid bias is applied. It is not only a question of the strength of the signals, but also of the actual quality and performance.

Trimming Precautions.

With ganged condensers, a trimming condenser is generally provided across one or more of the circuits so that they may be brought into tune. This method is fairly convenient in many ways, but sometimes the capacity of the aerial will completely upset the whole of the tuning, and as aerial capacities vary very greatly, it is important to have some means of avoiding interference with the tuning in this way.

One arrangement which is often used is to introduce a condenser of small capacity in series with the aerial, and before the point at which the aerial lead is connected to the top of the tuning coil. The capacity of this condenser may be as small as 35, or even 25 micro-microfarads. With this arrangement the aerial tuning will alter only a very slight amount with different aerials, so that the upset in the trimming department is relatively small.

Effect of Aerial Capacity.

Another arrangement which is sometimes used, is to connect the aerial to a tapping on the tuning coil, preferably a

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

tapping fairly near the earthed end of the coil so that the effect of the aerial capacity is greatly diminished. Of course, this may at the same time reduce the signal strength, and it is a question for you to decide whether the signal strength will stand reducing.

On the other hand, as I mentioned before in these Notes, the connecting of the aerial to a point on the tuning coil near the earthed end will, as a rule, have the effect of sharpening up the selectivity. Of these two arrangements, the small condenser in series with the aerial will often give a greater signal strength than the other.

In many manufactured receivers one or other of the two arrangements mentioned above is used in lieu of the trimming condenser.

"Pre-sets" for Trimmers.

By the way, talking about trimmers for ganged condensers, many of you probably use pre-set condensers for this purpose, and the question arises as to how long these pre-set condensers really remain set. It depends, of course, upon the particular construction of a pre-set condenser, but in some cases I have known these to vary quite considerably within a short period of being adjusted.

If, therefore, you are using ganged condensers and the ganging does not seem to be quite perfect, it is a good plan to try adjusting the pre-set condenser again, as in all probability you will find that this has changed slightly.

Another reason why difficulty may sometimes be experienced in ganging up circuits, is because the coils are not properly matched.

This does not necessarily mean to say that the coils are not in themselves matched, but it may be that when they are in their working positions, circumstances alter their effective inductive values.

Matching Coils.

For instance, suppose one of the coils is near to a tuning condenser, or any other metal part for that matter, this will have the effect of reducing its inductance and, of course, throwing out the matching of the coils as a whole.

So you see that it is not only a question of getting the coils matched in the first instance, but also it is equally important to have them matched in their operating conditions.

This alteration of the inductive value of the coil due to the presence of the metal plate, is the basis of a system of tuning known as "spade" tuning, which was quite popular a few years back.

In case spade tuning may not be familiar to the present day generation of radio amateurs, perhaps I should mention that a metal plate was adapted in relation to the coil, in scissor fashion, so that the effect upon the tuning of the coil could be readily adjusted.

Anyway, all this shows you how important the effect of neighbouring metal parts may be upon the tuning of the coils, and before going to any elaborate trouble with your ganging you should first of all make sure that the coils are properly matched in their operating positions.

Power-Grid Detection.

A good deal has been said lately about power-grid detection, and you may remember an article of mine on this in "P.W." some little time back. Without going in for full-blooded power-grid detection, however, you can often obtain a distinct advantage by trying, so to speak a measure of it. For instance, you may try using a smaller value of grid leak, tuned to perhaps half a megohm instead of the conventional two megohms.

If this produces an improvement in some ways, it may at the same time upset the reaction, and that will have to be corrected. A simple way of counteracting the interference with the reaction is to use a potentiometer across the low tension, and connect the grid leak to the slider of the potentiometer instead of to L.T. positive.

At the same time, it is often a good plan to use a higher value of H.T. on the detector than is commonly used. This naturally depends upon the type of valve employed as detector, and with some types the value of H.T. must be comparatively low, but with certain high-impedance valves which are often used as detectors, as much as 100 volts, or even more, may be necessary for the best results.

Aim at Efficiency.

The detector is really the most vital and sensitive spot in the whole circuit, and it is well worth while to spend a fair amount of time upon getting the detector working under the best conditions. This is far more important than either the H.F. or L.F. amplifiers. I have often examined sets in which a good deal of care and attention has been given to the amplifiers, particularly the H.F., but in which the detector was operating under sadly poor conditions.

Varying the Tone.

I said something in "P.W." a little time back about various forms of tone control, the simplest being an arrangement of choke or condenser in series with a fairly high resistance. The object of the resistance (a variable resistance, by the way) is simply to control the amount of by-passing which is brought about by the choke or condenser. The condenser, of course, by-passes the higher notes and the choke lets through the lower ones.

Without going to the length of making a regular tone control, however, you can often obtain much improved results from your loudspeaker by connecting simply a fixed condenser across the output circuit or across the loudspeaker itself. This has the effect of reducing the strength of the upper audio frequencies to an amount which increases with the capacity of the condenser.

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

A large condenser will weaken them considerably, a small condenser will only weaken them slightly. Listeners have their own particular tastes and fancies as regards the modifying of the tone for different items, dance bands, instrumental music, songs, and so on.

A Set of Condensers.

In some cases quite a useful arrangement can be made by using a number of fixed condensers of different capacities so that any one of them, or any combination, can be connected across the loudspeaker. The most useful values of condenser for trying in this way are about ·001, ·002 and somewhat larger values.

It is not generally much good using just one condenser without any means of varying the effect. Either you must have, as I say, a set of condensers of different values on hand or else you must have some form of control such as the variable high resistance in series with the condenser.

Controlling H.F. Amplification.

There are various methods for regulating the amount of high-frequency amplification obtainable in a set, although they all have their particular drawbacks. One method which is very commonly used is a potentiometer in the screen circuit of the screened-grid valves. The potentiometer may be adjusted so as to reduce the voltage applied to the screen below the normal value and this will have the effect, of course, of reducing the H.F. amplification.

It is important to note, however, that the reduction in amplification is brought about according to this method by changing the characteristics of the valves, since the impedance of the valves is increased and the slope is reduced. Now this may be all very well over a certain range, and in practice, in certain conditions, the method is reasonably satisfactory. It depends very largely upon the strength of the incoming signals.

Bearing in mind that you have reduced the working part of the characteristic curve of the valves, you will see that if the incoming signals are exceptionally strong, such as the signals, for instance, from the local station, you may run into distortion. So if you are thinking of using this method, you have to decide beforehand whether the signals you intend to receive will be strong enough to cause distortion owing to the limitation of the working part of the curves.

Components and Tone.

Referring to the question of the tone of the reproduction at the loudspeaker, this depends upon the characteristics of various components used in the circuit and sometimes, altogether apart from any actual tone-control device at the output, you can do a good deal to give the tone any

(Continued on next page.)

TECHNICAL NOTES

(*Continued from previous page.*)

particular desired quality by choosing one or more of the components in the proper way.

For instance, a low-frequency transformer may have a rising characteristic, that is to say, a rise in its characteristic curve at the higher audio-frequency end. A transformer of this kind will tend to bring out the higher notes with greater strength and so is useful in cases where the loudspeaker, for instance, only reproduces the higher notes poorly. In some cases the tuned circuits in a set may have the effect of reducing the loudness of the higher notes, and a transformer of this type will go a long way towards remedying the defect.

Present-day Layouts.

It is not more than two or three years ago that we used to aim at laying out a set with plenty of spacing between the various components so as to avoid any interaction. Now, however, are the days of compact arrangements, and in view of the great advances which have been made in shielded components, and in the use of shields between components, layouts have become very much smaller and space greatly economised.

There is, however, all the difference in the world between a compact layout properly shielded and a layout in which the parts are merely crowded together. Some of the present-day portable sets on the market are really beautiful examples of carefully-designed layout and will accommodate a receiver the equivalent of which, on the old-fashioned arrangement, would have occupied half a dozen times the space.

Compactness and Shielding.

In arranging components close together, it is essential to avoid stray couplings which will render the set entirely unstable. This is one of the reasons why, when you are setting to work to make a receiver from a published design or blue print, you should be so very careful to keep to the designer's instructions.

Always bear in mind that before a design is published, in "P.W." for instance, every detail of the arrangement is carefully thought out by experts and tested, and there is really no need for you to depart from it in any way If you are expert yourself and you wish, for some particular reason, to modify the design, you may be quite well able to do it, but for the majority of amateurs it is, as I say, a very wise plan not to risk introducing modifications, especially in regard to screening, which may only run you into trouble. Stick faithfully to the designer's layout, and you should get the full results of which the set is capable.

THE LISTENER'S NOTEBOOK

(*Continued from page* 130.)

Of course, Davies is old for a boy singer, but, even so, one cannot help being struck by his purity of tone and the confidence with which he sings. There is never a tremor. The B.B.C. should see we hear more of Iwan Davies.

* * *

If there is one place where the word psychology stands out in bold relief, it is at the B.B.C. And yet one wonders if the science is studied from all angles. Surely it should be clear that listeners, sitting themselves down for an hour's vaudeville, are at once made fidgety when the programme opens with "Good-night, Vienna," which has been played at least three times before during the day.

* * *

I should say that "Songs from the Shows" is running Vaudeville very closely for popularity just now. Though it must be a strenuous hour for the two solo artistes concerned, neither of them showed signs of fatigue. I can't say which I like better with George Baker, Olive Groves or Winifred Fisher.

* * *

I don't think Margaret Elwes could have been the only contributor asked to sing less secular songs on Good Friday. Almost every musical turn seemed black-edged. Gladys Ripley, for instance, was particularly depressing.

* * *

I was very glad, however, to tune in to the talk on "Holy Week in Seville." It was extremely interesting. The introduction of gramophone records into a talk was something which added to the interest, although this particular talk needed no such support. The story, full of local colour, was beautifully told.

* * *

There had been plenty of preliminary talk over the recent vaudeville presented on the music-hall pattern, but, candidly, the show did not set the Thames on fire. It contained nothing original and was only saved from being somewhat of a flop by Gus Elen, who came on last.

What an example he would have been for some of the artistes had he been placed earlier in the programme! Here was a man of seventy, singing with a verve and vigour which convinced one he was in love with his job, while every word, both when he was singing and addressing us, came over as clear as a bell.

The intermission music might have been all old music-hall airs, I thought. Finally, I would never allow a present-day vaudeville to include (a) Londonderry Air, (b) One More Chance, and (c) Three lots of comedian "twins."

* * *

Those folk—and their name must be legion—who have so missed A. J. Alan were, doubtless, all of a glow when Hugh E. Wright came on the scene with his "Taxi" story. It was splendidly delivered, nothing marring it whatever. Mr. Wright has a voice that at once catches the ear, and if we don't hear more of him then the judgment of the B.B.C. will be sadly at fault.

* * *

The patrons of the Argyle Theatre, Birkenhead, have certainly not lost any of their old-time vitality, if riotous applause is indicative of vitality. Cosgrove and Westwood seemed to carry them by storm, but frankly, they were just noise to me. Give me Gus Elen every time. Anybody may have the Melody Boys for me!

* * *

With the B.B.C. orchestra split up into so many sections, we are likely to find listeners also forming themselves into different camps. For myself, I am enlisting under the banner of Section E, conducted by Mr. Edward Clark, with Marie Wilson as leader. What a glorious 45 minutes they gave us that night the Music-Hall Show grated on the nerves of so many!

MIRROR OF THE B.B.C.

(Continued from page 130.)

of "Special Providence," by Mary Agnes Hamilton, who was for several years B.B.C. critic of novels. Thursday, April 14th, marks the first vaudeville appearance of Sir Nigel Playfair, who is giving a recitation of the prologue to A. P. Herbert's operetta "Derby Day."

In the same programme will be an abbreviated version of Mr. Herbert's operetta "Plain Jane," which will be sung by Vivienne Chatterton, Esther Coleman, George Baker, and Warde Morgan, under the conductorship of Richard Austen, who composed the music.

I have already mentioned that George Gee, the well-known comedian in "White Horse Inn," will broadcast for the first time in this vaudeville entertainment; and another newcomer to the microphone that night is "Frederique," who sings French and Italian songs. With them in the studio will be Ross and Sargent and Colin Wyatt, the Cambridge ski-ace and yodeller.

"Little Miss Make-Believe."

Many admirers of the work of Mr. Charles Brewer, the author, composer, and producer of more than a hundred light shows at the Birmingham station, will be delighted to learn that one of his most successful shows, "Little Miss Make-Believe," is to be repeated for National and Regional listeners on Tuesday and Wednesday, May 3rd and 4th respectively.

"Personally, I am rather surprised this was not done long ago, because in "Little Miss Make-Believe" Mr. Brewer has a radio-musical comedy as good as anything done before or since it was first broadcast for Midland Regional listeners as far back as December 6th, 1930.

An Exciting New Series.

I hear that Admiral E. R. G. R. Evans, C.B., D.S.O., and Admiral Gordon Campbell, V.C., D.S.O., have both agreed to describe some of their adventures in the series of talks to be given on Saturday evenings under the title of "Hazards."

Admiral Evans is a New Zealander, and only last year relinquished the command of the Royal Australian Navy. Most people will remember how, with H.M.S. Broke under his command, and H.M.S. Swift of the Dover Patrol, he engaged and defeated six German destroyers, one of which was rammed by the Broke.

But it is not of the war that Admiral Evans will talk, but of his adventures with the Antarctic Expedition of 1910–11, on which he accompanied Captain R. F. Scott as second-in-command. Scott and other members of the main party all perished, and Lieutenant E. R. G. R. Evans, as he then was, had charge of the subsidiary party which reached its base after narrowly escaping death.

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Here is the first list of "P.W." official exhibitors. Visit your local Radio retailer and ask for a demonstration.

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Real Radio Service,
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E. O. Ellis,
15, The Village, OLD CHARLTON, S.E.7.
M. Kams & Co.,
9, High Street, PUTNEY, S.W.15.
J. Collier & Sons, Ltd.,
53-57, High Street, PECKHAM, S.E.15.
G. Goodwin,
6A, The Broadway, WOOD GREEN, N.
T. M. Barbour,
24, Knights Hill, S.E.27.
F. Galt,
56, Norbury Road, THORNTON HEATH, S.W.
Bush RADIO Stores,
184, Railway Approach, W.2.
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7, Fulham Palace Road, W.
Morgan & Gaunt,
25A, Montpelier Vale, S.E.3.
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15A, Delacourt Road, BLACKHEATH, S.E.3.
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95, Valentine Road, Wood Street, E.17.
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G. Stern,
115, Fleet Street, E.C.4.
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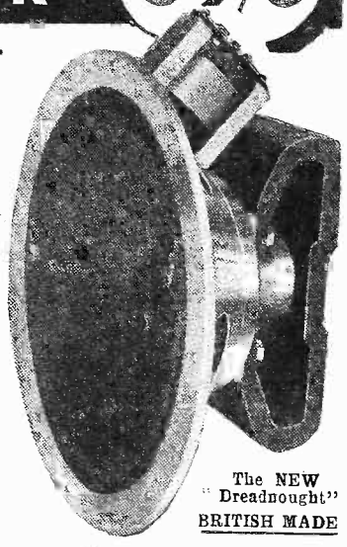

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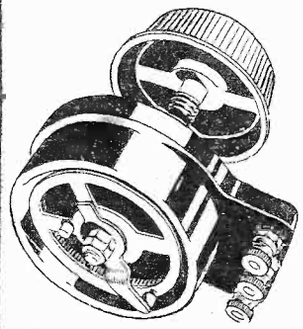

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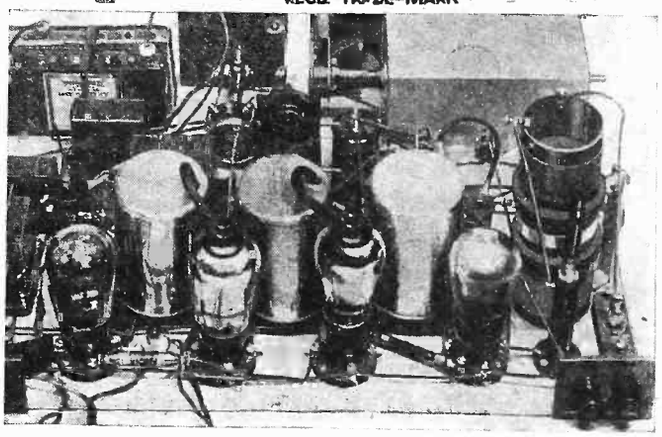

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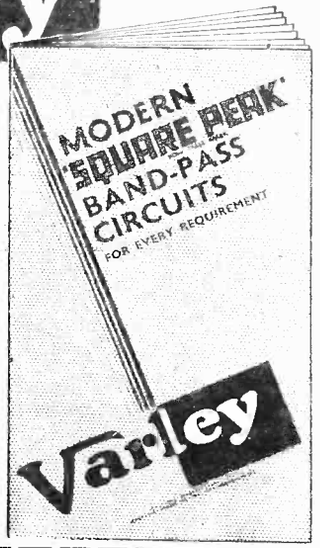

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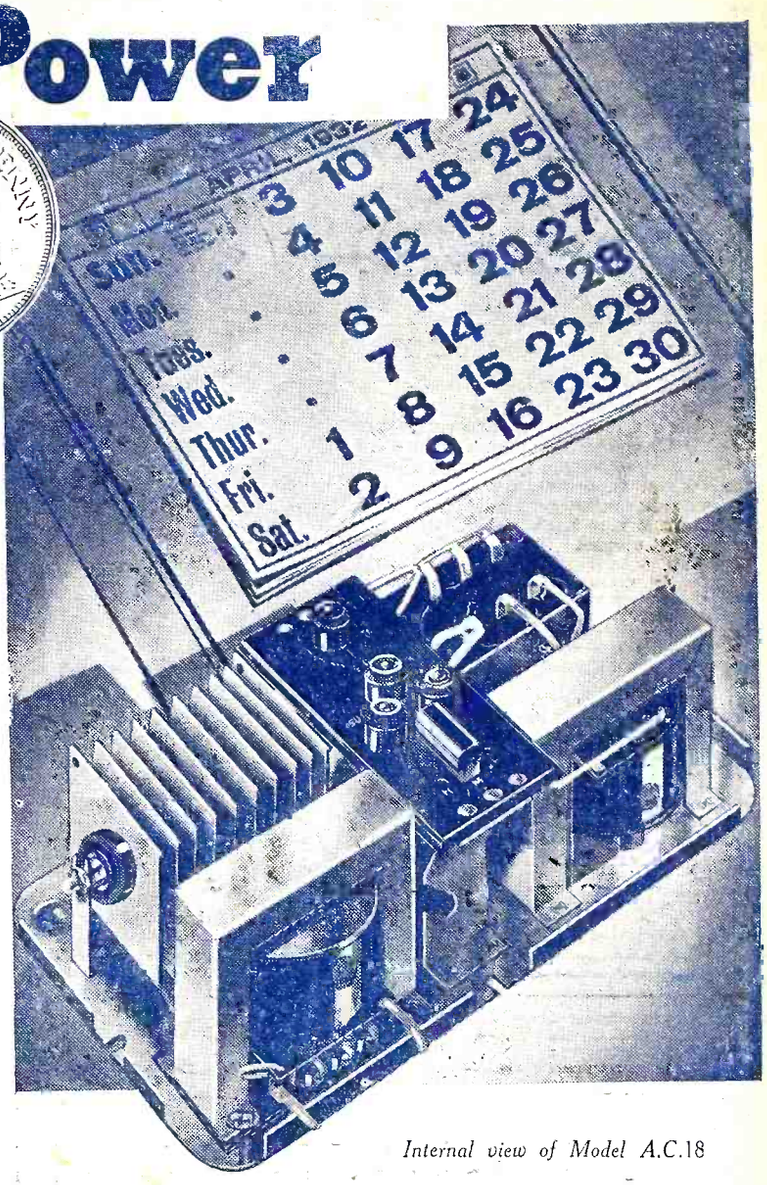

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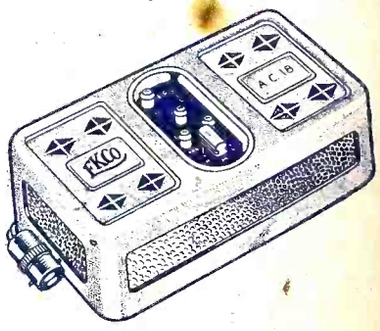

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SOCIETY TIT-BIT
"NOT SO EASY"
SLOW MORSE
GARDEN LUCK

RADIO NOTES & NEWS

SHY CHAMOIX
A FAIR COP
RADIO AND HISTORY
THE "COSMIC"

Are We? We are Not!

NO, not downhearted a little bit. Sterling is appreciating and the world is putting its money on the big British drum. We, the taxpayers, have no money left, but we do see life, and see it steadily and whole.

Not even the pin-pricking of the Ibero-Hibernian demagogue (no prizes!) of Dublin can put down our tails. Even during 1931 the radio trade increased its turnover by almost 50 per cent, and the Post Office issued 900,000 new licences!

As against the 1,250,000 sets sold last year it is estimated that during this year 1,800,000 new sets will be sold. Mostly "Cosmics," what?

Life of Morse.

THE letters and journals of Samuel F. B. Morse, whose name is imperishable from the annals of telegraphy, have been brought together by his son, Mr. E. L. Morse, and published in the U.S.A. in two volumes at ten dollars a set. The books are illustrated with reproductions of Morse's paintings, and with diagrams relating to his designs for the telegraph.

This news will be of world-wide interest to those engaged in the communications business. (I should love to have the books myself, but ten dollars in sterling is not spendable, at one fell swoop, on books during these hard times!)

More U.S.A. News.

OWEN D. YOUNG, of the famous "Young Plan," and Chairman of the Executive Committee of the Radio Corporation of America, got 27 votes for President of the U.S.A. at a recent election amongst the students of Princetown University.

Dr. Irving Langmuir, well-known for his work in connection with valves, has received the $10,000 prize of "Popular Science Monthly" for notable scientific achievement.

During the search for the Lindbergh baby, all the resources of the U.S.A. cable, radio, telegraph and telephone companies were employed; even a part of Lindbergh's estate was invaded to form a telegraph headquarters, and television portraits of the baby were on the air.

Society Tit-Bit.

THIS is to announce that the Preston and District Radio Research Society has been formed and is ready to enrol more members. Particulars may be obtained by writing to the Secretary, Mr. J. E. Bradley, 89, Friargate, Preston. The Society's trustees are the Midland Bank, Ltd. This should create confidence in the minds of the hardheaded Lancashire folk! Good luck to the new society and its researches.

"Not So Easy, My Dear Watson."

SO W. L. S. has unearthed a sleuth-hound who professes to have discovered that W. L. S. and "Ariel" are one person, and that I (we or he) am (are or is) a Cumberland amateur! Far from this being a clue to "Ariel," it is a joke at W. L. S.'s expense. But he must take it like a sportsman, and give up his Cumberland accent; while I shall have to change the colour of my wig and resign from the H.A.C., using only the longest waves in future.

Charged While You Wait?

I HAVE here a report that a South Shields man has designed a switchboard with which it is possible to charge or discharge an accumulator within a few minutes. He has also produced a type of cell which is robust enough to take in a full cargo of "juice" almost at a gulp. So, if all this proves to be accurate, we shall not need to trouble quite so much about "charging rate" in future.

Slow Morse for Students.

THE Radio Society of Great Britain has organised programmes of slow Morse transmission for the benefit of students of that code. The transmissions take place on Sundays at 11.0 a.m. on about 160 metres; they are preceded by

(*Continued on next page.*)

HENRY'S HAUL—THE NEW B.B.C. DANCE ORCHESTRA

Here is Henry Hall with the members of his B.B.C. Dance Orchestra, which recently took over the job that had been so long and so ably done by Jack Payne and his "boys." Note the smart uniforms—one of Henry's ideas.

NEWS—VIEWS—AND INTERVIEWS *(Continued)*

an announcement and last for ten minutes.

This arrangement will, I hope, be welcomed and utilised by many of those who from time to time have written to me about their difficulties in getting Morse practice. If you use these practice programmes, please write and inform the Society, at 53, Victoria Street, London, S.W.1.

Luck o' the Garden.

TOOK a Saturday off last week for the express purpose of trimming the trees in my garden and wasting another gallon of paraffin on that ever-cussed dump of sodden leaves which I can't burn up. Having acquired a twelve-foot tree-pruner I sallied out and practised on the "May" tree which is trying to shove the veranda down. Excellent! Most of the bits fell next door! I then came to the lilac tree which supports my aerial.

Taking special care not to clip the wire—I clipped the wire. The insulator shot away like a bullet and smashed a pane in my pet ground frame, besides startling our new kitten into *cat*alepsy! Yes, life is odd!

Short-Wave Note.

C. H. B. asks for the name of the station which was sending V's, A B C and O K N on about 50 metres at 20.30 on February 12th. Sorry I cannot trace the call-letters; perhaps some listener on that "band" can do so. In answer to C. H. B.'s further query for a book of call-signs, I would again refer him to the "Radio Amateur Call Book Magazine," a quarterly, at 5s. 6d. a copy, obtainable here from Mr. F. Carter, Flat A, Gleneagle Mansions, Streatham, London, S.W., who compiles the British section. The current issue contains over 190 pages, 11½ in. × 8½ in., of up-to-date information about amateurs in every country which boasts one or more.

What Makes Chamoix Shy.

SWITZERLAND, being a sort of a trilingual country, has had to plan its broadcasting system accordingly. The German-Swiss have Beromunster, and the French-Swiss Sottens. Italian Switzerland is to have a station near Tessin; it is on order by the Administration of Telegraphs and Telephones from Marconi's, and is expected to be ready by the end of the year.

I am informed that it is to be erected on Monte Ceneri and that its power will be 15 k.w. (unmodulated) in the aerial. So far no one has written to say that radio causes avalanches and makes chamois shy. But there's all eternity before us!

Book Broadcasts.

PUBLISHERS and booksellers are complaining that the B.B.C. is neglecting to devote an appropriate proportion of its "ether time" to books and literature. The *Publisher and Bookseller* has analysed the B.B.C.'s programmes and the amount of time which is given to various subjects and finds that, calling the share of books and literature 1, music is 47·4; news, 7·7; education, 5·3; religion, 4·3; vaudeville, 2·85; science, 1·15, and art, 0·41. A few other types of matter are included in the full analysis.

"THE COSMIC CIRCUIT."

The Editor, "Popular Wireless."

Sir,—Wishing to give to a friend living in the country a simple wireless set, I consulted my chauffeur, Mr. L. T. Walker, who has made sets for himself, and he drew my attention to an article by Mr. G. V. Dowding about a special 3-valve set on page 1253 of "P.W." for 13th February, 1932. Mr. Walker offered . . . . . to make up and wire a set in accordance with the blue print diagram which accompanied my copy of "P.W."

In the course of a day after the things arrived he had put them together in accordance with the blue print, and on connecting to a small aerial inside a barn here, it worked well, straight away. The switch that changes easily and automatically from long waves to short in the process of tuning is an attractive feature. Daventry 5 X X was very loud; various other and continental stations could be easily got; and the performance was excellent. I listened to the set that night, and next day sent him off to my friend's house to rig up an aerial and install it. By evening the whole thing was done.

Whether it be by reason of the tuning of the aerial, which the connections abundantly arrange for, or for a combination of reasons, I have seldom heard a 3-valve set giving a louder or better results in this neighbourhood. It was seldom necessary to use any reaction. Other amateurs may like to take advantage of the arduous, but successful efforts of Mr. Dowding and his co-workers to evolve the simplicity and efficiency of this remarkable set. The inventors describe their determination to design "a first-class instrument for ordinary broadcast reception," and I am glad to testify that they have succeeded.

Yours truly,

Nr. Salisbury. Oliver Lodge.

Let People Know.

I AM inclined to agree that more time should be used by the B.B.C. on talks about books, though I am taking this analysis as correct for the sake of argument; I should like to know the B.B.C.'s side of the question, however.

To the objection, which I foresee, that people want more amusement and less education, I would reply that the B.B.C., having revealed to tens of thousands the delights of the world of music (a world of whose magnitude and beauty many were ignorant), it can reveal also, and to far more people, the delights of the world of books, to their everlasting benefit and joy.

A Fair Cop.

I DID not expect to catch the "Telegraph and Telephone Age" napping, but it seems that even Homer nods sometimes. In a description of an American aeroplane radio set, this periodical says, "Operating on a short wavelength which pierces the roar of motors, it requires only one-twentieth the amount of power used by a woman's curling iron!"

Leaving out the "dame" stuff, I would ask the acute, non-effete, editor of the "T. and T. Age," how the *length* of anything can *pierce* a noise or roar. "P.W." pauses for a reply, being always ready to learn.

(In the meantime our artist suggests *his* solution!)

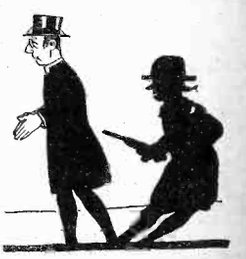
Wireless and History.

LIEUT.-COMMANDER KENWORTHY'S first and fascinating article, "How Wireless Would Have Altered History" (April 2nd), which dealt with the defeat of the Spanish Grand Fleet in 1588 has reminded me that the *lack of* wireless contributed to that defeat in a positive manner. After the unsuccessful British expedition to the Low Countries the year before, Drake decided to "singe the King of Spain's beard" by sea, as a set-off to the military failure. He got out of Plymouth only just in time to escape orders from Queen Elizabeth that he was not to annoy Spain.

As a result he did enough damage to the Armada lying in the Tagus to put off the threatened invasion of England for over a year. But wireless, had there been such a thing, could have recalled him before he lost sight of Plymouth Hoe.

Promotion for Pirates.

THE "Indian Wireless Magazine" in a well-meant Open Letter to "pirates" reveals that it cherishes astounding ambitions for the conversion and future status of those gentry, for the concluding sentence runs, "Let us hear that you have turned from 'Pirate' to 'Prelate'." A long jump, that! One other phrase struck me as worthy of comment. "You stand like a Thief in the Docks." Catching the next boat for the nearest non-extradition port, no doubt!



ARIEL.

THESE RADIO COMPONENTS

A COMPLETE AND CRITICAL REVIEW

Our Chief Radio Consultant here commences the most important series of articles on the subject of modern radio products that has ever been published, for he is going to "write his mind" without fear or favour. P. P. E. can always write interestingly, and in these exclusive critiques he will use the full force of his virile pen in an endeavour to tear the last veils of mystery and camouflage from the present day products of the wireless industry for the benefit of "P.W." readers.

THE Editor has suggested to me that I should write a series of articles on components. I have consented.

How slowly things develop. What a series of first approximations! Five years ago—or is it six?—I heard reproduction which satisfied me. Nine-tenths of reproduction I hear to-day is—well, frankly, awful! I return to my detector and my two-note mag. and my moving-iron speaker, I turn it on, I listen, I wonder. My set was expensive when it was bought, more expensive than it need have been, because it did not sell in large quantities. It has no spectacular qualities, it will not reach out far—it simply makes music and natural speech.

The fact that I cannot get "foreigners" is not the set's fault. I live in a place where there is much shielding and much electrical interference. I do not deny that there is a lot of pleasure in reaching out. But I do think that fundamentally one wants quality. Whatever one rakes in, surely it should be presentable?

The Basis of Judgment.

This is not irrelevant to my introduction. One must have a basis of judgment. My basis is that the resulting noise shall be pleasant.

I have another introductory paragraph or two. They concern another difficulty. I see that difficulty so clearly that it may take me a whole article to explain it. Read on; fear not.

I feel that the amateur movement requires encouragement. To think, to plan, to create, brings us nearer happiness than any other occupation we have so far discovered. "He is wrapt, he is lost in something," are words we often hear, and they mean what I have said, that to create is to forget oneself, to forget oneself is to find room to remember happiness.

One may have a passion to build bridges, great, swinging arcs of steel, contemptuous of angry flood and gaping ravine. One may stand staring at the beauty of a locomotive and itch to be the brain to conceive its subtle power.

One may see in the fragile tautness of an aeroplane, swooping and flashing in the sunlight, something intensely personal; one may long to make and design aeroplanes. In every one of these cases one is forced to satisfy only one of those longings by making bridges *or* engines *or* aeroplanes one's career.

It is difficult to choose, and circumstances sometimes come along and rule them all out and one must be something else. Here, it seems to me, is where wireless may fill a whole side of one's life because one can create and design within the limits on one's own home, and within the limits of one's spare time.

The work is delightfully compact, and yet it is a full scale model which develops; a model which, when created, can give one and one's own real pleasure in its performance. More than this, there is at one's disposal a mine of stimulating information, books and journals of all kinds.

"P.W." Comradeship.

I enjoy writing and working for POPULAR WIRELESS because I always feel it is not just work as such—it is a sharing with you of my knowledge and experience so that you may have as much pleasure in reading as I have in writing.

My difficulty is to sense your mind, to know what you would like me to tell you—if I can. My difficulty in writing these articles on components is to know what standpoint you would like me to take up, which way I should expose the problems for you. You see, a component is only a component *in a whole set.*

I give you an example of my difficulty in terms of a perfectly fair instance. If you designed a set for a flat, overall characteristic between 30 and 8,500 cycles per second, you might with one loudspeaker and one station get a lovely result; with another loudspeaker and/or another station, a perfectly foul result.

For example, some loudspeakers are bass heavy *if* you give them equal voltage input over the full gamut 30 to 8,500 cycles. But lots of sets cut off bass because they use a pentode with the output (auto) transformer "tapped up" too much. Now, the balance between a really too bass heavy loudspeaker and a really too high effective impedance output valve may just even up perfectly. But if you were to substitute the pentode by a low impedance valve, that loudspeaker would boom the place down.

Balanced Design.

Again, some types of interference, as typically that frying noise you get when the signal is a bit weak, have a characteristic frequency around the six thousand mark. Now the "perfect" loudspeaker reproducing full strength at 6,000 cycles and giving all those very clear "s" sounds in "Sister Susie's sewing shirts for soldiers," gives a terribly strong frying noise interference too.

A theoretically worse speaker cuts off at 5,000, and the background noise is far less.

Analogously, So-and-So's plug may be perfect for the X.Y.Z. engine; it may be a failure in the C.B.A. The M. magneto—but I labour the point.

What I must do is to ask you to keep all these points of view in mind when I am discussing components, and to help you I will try and make it clear from what point of view my criticism or praise is directed. Then we shall all understand one another. At least *I* hope so.

I think it better to take components from end to end. Aerial and high-frequency, detector, note magnification and then loudspeakers. One might then sum up and see how to balance these components with a design, a design to suit the purse and pleasure of the user.

Next week, then: Coils and Tuners.

NEXT WEEK CAPT. ECKERSLEY SURVEYS "COILS AND TUNERS"

NOTES FROM THE MIDLANDS

By OUR SPECIAL CORRESPONDENT.

With the extension of the B.B.C. headquarters, the use of a temporary outside studio and preparations for the new "Daventry" stations, there is much activity in the Midland Region. Our Correspondent comments on the latest developments of this activity and has much of interest to say concerning programmes.

PROGRESS with the extensions to the Midland Regional headquarters in Broad Street, Birmingham (where a new large studio and other additional accommodation is being provided) is not rapid. There have been hitches, mainly of a legal character.

In the meantime programme activities in the Midlands go on very much as usual, but with certain interesting new ventures. The gramophone recitals introduced by Mr. Robert Tredinnick (one of the Birmingham announcers) have aroused enormous popularity, and are to be continued at quite frequent intervals.

A One-Man Show!

For some time after the transfer of the other announcer, Mr. Jack Cowper, to London, in February, Mr. Tredinnick carried on alone, but Mr. T. A. G. Lidell has now taken up the position vacated by Mr. Cowper. Mr. Lidell graduated at Oxford in 1930, has studied music, and has been on the stage.

Mr. Charles Brewer continues to produce his bright and breezy shows (for which he often writes many of the lyrics and much of the music, as well as doing the producing). His series of "Nine-thirty Novelties" come to an end, for the time being, on April 11th, and on April 25th, he is offering listeners a programme of rather a new type called "The Bogey Foresome."

Then he is going up to London to produce "Little Miss Make-Believe," which was one of his most successful shows. This will be broadcast on May 3rd and 4th, Regionally and Nationally, with Clapham and Dwyer in the cast. This is the second time Mr. Brewer has been invited by Headquarters to produce a show there.

By the way, with typical fastidiousness, the B.B.C. has sent a note to the newspapers pointing out "as slight mistakes have occurred" that Mr. Brewer's correct title is Principal Assistant and Producer. So now we know.

The "Nine-thirty Novelty."

The versatile Percy Edgar, Midland Regional Director, will be one of the cast in the "Nine-thirty Novelty" on April 11th. The enunciation has been the weakest point in most of the "Novelties." (This does not refer, of course, to Mr. Edgar, who has one of the clearest and most pleasing of voices, but to the chorus singing).

Mr. Edgar plays another broadcast rôle on April 23rd, when he will be down at Stratford-on-Avon giving a running commentary on the scene preliminary to the opening of the Shakespeare Memorial Theatre by the Prince of Wales, whose speech will also be broadcast. This outside relay is of National importance, but there is also a tendency in Regional programmes to send the microphones out into the towns and country more than formerly.

The Midland Regional programme does not include nearly so much outside broadcasting as the North Regional programme, but it is certainly on the increase. This raises the question of whether there is more good-class outside material (such as orchestras, concert parties, and theatre relays) in the North of England than in the Midlands.

Or is it simply the result of a difference of outlook between the B.B.C. staff in Birmingham and their colleagues in Manchester, the Northerners attaching first importance to reflecting outside activities in the radio programmes, and the Birmingham officials giving greater importance to studio productions?

In its Midland "Towns" series of programmes the Midland Region has, of course, reflected external talent in a way that the North has never attempted. On April 30th, Wolverhampton is the subject of one of these broadcasts.

The B.B.C has foreseen that when the alterations to the premises at Birmingham get properly under way there might be some dislocation of studio activities, and arrangements have therefore been made for the use temporarily of an outside studio in Birmingham. This studio was offered to the B.B.C. by Messrs. William Bayliss, Ltd., who had recently constructed it for their own purposes. It measures 100 ft. by 21 ft., and 15 ft. high, and will be used for musical programmes.

I mentioned in my last Midland Notes in "P.W." that a film company had approached the B.B.C. with a view to making a "talkie" behind the scenes at the Midland Regional station. The company was British Movietone News, and the B.B.C. agreed to the distribution of such a film in the Midlands only.

The film company came to the conclusion that it would not be economical to take the film unless it could be shown more widely. The B.B.C. has now suggested that it shall be taken at the London headquarters and have agreed to it being distributed nationally, and at the moment of writing arrangements for the taking of the film are in hand.

The B.B.C. Film.

It is surprising that this sort of thing has not been done before, but probably the B.B.C. has been waiting until its new premises in London and elsewhere were occupied before it thought of showing itself to any great extent on the screen. There would, for instance, be little point in taking a film (except as an historical record) at Daventry, seeing that such changes are to be made there. When the seventeen aerials of the Empire short-wave station have been erected, the site of the old 5 X X will be strangely transformed.

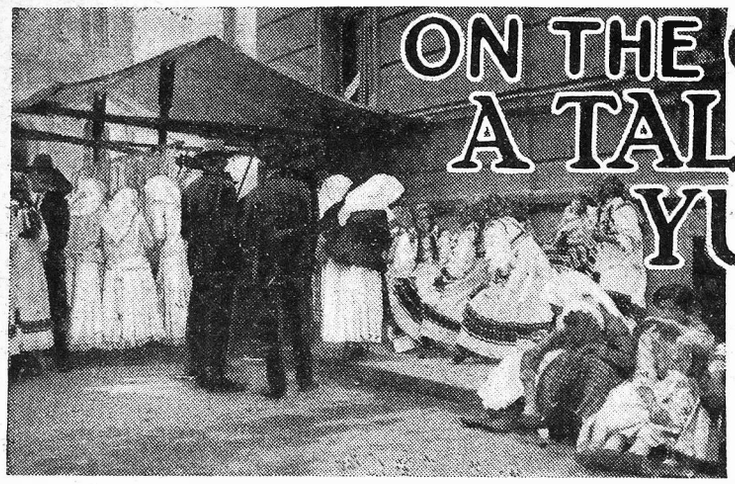
The B.B.C.'s mobile transmitter has been steadily testing the proposed site for 5 X X and 5 G B at Droitwich, and in the meantime the two short-wave transmitters intended for erection at Daventry are being built by the Standard Telephones and Cables Company in London.

Both on account of the transfer of 5 X X and 5 G B nearer Birmingham, and on account of the higher power which they are to have, the signal strength of these two stations in the Midlands area will be greater than at present.

But what is more important is that when 5 X X has 100 kilowatts power it will really and truly be a "National" transmitter, capable of giving a service from Land's End to John o' Groats.

INSTRUMENTS OF THE PAST IN MODERN BROADCAST

A scene recently in the Vienna studio during a 200th birthday celebration concert of Joseph Haydn, Austria's great composer. Both the piano and string instrument were actually the property of the great musician himself.



ON THE OTHER SIDE—A TALK WITH A YUGO-SLAVIAN LISTENER

By A SPECIAL CORRESPONDENT.

Situated on the shores of the sunny Adriatic, with mingled peoples and diverse religions, Yugo-Slavia is a singularly fascinating country. And you will thoroughly enjoy this interview with a Yugo-Slavian lady who is a keen radio listener.

A CHARMING friend of mine, who, apart from being a Serbian with long listening experience in Yugo-Slavia, has the advantage, possessed by few mere listeners, of knowing all about the other side of the Yugo-slav microphones, has very kindly told me all about radio in her beautiful country and has let me have some interesting photographs as well.

An Unspoilt Country.

"Few Britishers know Yugo-Slavia," she said. "It has not yet become a tourist country for western Europeans, although Germans and Czechs and Hungarians flock to enjoy the Dalmatian sunshine every year.

So does Bernard Shaw from time to time, but the mass of the tourists stay in France or go farther off to Greece: and I am glad this is so, for tourists spoil even the most unspoilt country. I am sorry, too, because

HAVE YOU HEARD HER?

She is Miss Jelena Bilbija who announces the "Radio-Belgrade" programmes on 430·4 metres.

my country is hospitable and would be glad to welcome inhabitants of that cold and dreary island to sunny Adriatic coasts.

"Our population is made up of Serbs, of orthodox faith; of Croatians, mostly Roman Catholic; of Slovenes, all Roman Catholic. In Bosnia the Serbs are mostly Mohammedans—the long Turkish invasion, which lasted until fifty or sixty years ago, is the cause of this.

Peasants Predominate.

"I am telling you all this, as otherwise you will never be able to understand our broadcasting service. And then there is another important point—we are still considered one of the most important corn countries of Europe; most of our people live on the produce of the land, they are peasants. In Southern Serbia there are still many people who are unable to read or write; on the other hand, we are a very musical people.

"You will understand now that it is impossible that broadcasting be as important as in other countries. In Slovenia the Roman Catholic organisations own and operate the broadcasting service. A priest is the station director, another priest the musical director.

"Our Roman Catholic priests are first of all Slovenes, and then Yugo-slavs, and then *Roman* Catholics.

The First Balkan Broadcaster.

"In Croatia there is another broadcasting station. It was the very first broadcaster in the Balkans. It was opened in 1926.

"Enthusiastic amateurs were responsible for this. In Belgrade, the capital, a French company had a station, then the Post Office took over, and at last the London Marconi Company built a transmitter, and since then Belgrade has had regular broadcasting.

"It is typical of the political situation that a foreigner was chosen managing-director at Belgrade, and most of the capital is foreign, too, as far as I know.

"We listeners only number a little over 30,000 in the whole of the country. And the number only increases by hundreds and not by hundreds of thousands, like in Britain.

"We have to pay 300 dinars a year for our licence, but the postman comes and collects every month, so that we pay on the instalment system similar to listeners in Germany and the other countries near us.

"You will be unable to grasp that the only people who ever listen-in are the people in the towns; and only a very small percentage of the total number of inhabitants live in our towns.

Little Time for Listening.

"In Slovenia things are different. The village priest has a receiver, and one or other of the well-to-do peasants may buy a receiver. But in Croatia, by the time the man is back off the fields he either goes to bed or sits out in front of the door and does some gossiping, or goes to the 'pub.'

"People often compare us with Russia. Especially the conditions in Southern Serbia. Apart from the fact that we are not, and I think will never be, Bolsheviks, there is one thing against listening there—absence of the sun. We live outdoors, in the open all day long. And if we want music we play it ourselves.

"In Russia, with the long winter and the general organisation of Bolshevism, it is quite possible to gather the peasants together in halls and make them listen. But we are a free people and our peasant is an upstanding man on his own ground, and not a cultivator of other people's land. So you can't force him to do a thing he does not incline to.

A Privilege of the Few.

"Broadcasting could greatly help our peasants, could give them an interest in many other things besides the cultivation of the ground, but it will take a long time till they will spend money on a set.

"Then there is another thing which will keep broadcasting in Yugo-Slavia a privilege of the few for a long time yet—our Post Office collects the licence money, the companies get a part (far too little) for their expenses, and that is all.

PICTURESQUE!

In contrast with the smart young thing seen in the background note the picturesque garments of this Croatian peasant woman.

"The Post officials, and the State as a whole, is not awake to the importance of broadcasting as yet: or, at least, it seems so, for otherwise the government would have helped to build a high-power station so that our peasants would be able to listen-in on a crystal set. In Poland every person can hear Warsaw on a crystal set.

"As long as we have to buy valve sets, except in the towns, I am afraid the number of our listeners will remain limited. But, in spite of all this, we have good programmes.

"And we regularly interchange with Vienna and Prague for the big symphony concerts and opera performances. Our own opera-house performances from Belgrade, Zagreb and Ljubljana are regularly relayed.

"And now I hope I have given you an idea of our country, its three broadcasting stations, all belonging to separate companies and the small band of enthusiastic listeners."

MIRROR OF THE B.B.C. By O.H.M.

THE B.B.C. AND CANADA

PUBLICITY FOR B.B.C. OFFICIALS—"THE RUNGS OF THE LADDER," Etc.

MAJOR GLADSTONE MURRAY, who manages so successfully to obscure his name and activities on this side of the Atlantic, finds himself now in the full glare of American publicity. He has gone to Ottawa to give evidence before the Parliamentary Committee there on the subject of the future organisation of broadcasting in the Dominion.

If cabled accounts are accurate, this B.B.C. Canadian has found himself in the centre of a violent controversy in which he has given at least as hard knocks as he has received. A correspondent in Ottawa tells me that Major Murray created a profound impression. One Canadian Cabinet Minister is reported to have said, "this fellow may change the trend of radio thought of the North American Continent."

Publicity for B.B.C. Officials.

It seems to me that the time has come for the B.B.C. to reconsider its policy about personal publicity for its officials. There is, I understand, a rigid rule against personal publicity for regular members of the staff, the only exceptions at present made being those directly associated with dramatic production.

I feel that restrictions of this kind are not only silly in themselves, but also unfair to other members of the staff. Broadcasting is a monopoly in this country, and most people agree that this is right. But one of the consequences of monopoly is that members of the staff have no alternative employer in the same line of business.

This being so, surely they should have the benefit of restrained and dignified publicity of a personal kind if only to develop for them a little general goodwill.

"The Rungs of the Ladder."

Famous men, among them Lord Beaverbrook, Lord Ashfield, Mr. C. B. Cochran Mr. J. H. Thomas, the Poet Laureate, and Mr. W. H. Davies, will describe some of their early adventures and experiences in a new series of talks which starts at the end of April, under the title of "The Rungs of the Ladder."

The talks will be given on Monday evenings. A new Wednesday feature arranged by the "Talks Department" is a further experiment in broadcast dialogue called "Encounters," which is to follow the lines of the recent "Conversations in the Train."

"*A Topical After-dinner Show*" is the sub-title of a Rex Evans' programme called "Merry-go-round," to be produced by C. Dennis Freeman on April 12th. Elsie Randulph, who appeared with Jack Buchanan in the Hippodrome piece "Stand Up and Sing," Jean Melville, and Billy Thorburn are in the cast.

I have already given details of the arrangements to broadcast the speech of the Prince of Wales when he performs the opening ceremony of the new Shakespeare Memorial Theatre at Stratford-on-Avon on Saturday, April 23rd, and also of the running commentary by Mr. Percy Edgar describing the scene for listeners on the Continent and America, as well as the British Isles.

From Stratford-on-Avon.

On the same day, which is St. George's Day, Shakespeare's "Henry 5th" will be broadcast from National transmitters, as it has been arranged by Peter Cresswell, who will also act as producer. On Sunday, April 24th, National listeners will again be linked with Stratford-on-Avon for the relay of the Matinée Concert which the City of Birmingham Orchestra is giving under the conductorship of Leslie Howard. Frank Mullings, the well-known tenor, is to be the solo artist.

The oldest piece of music ever sent into the ether—"A Hymn to Apollo" which was composed nearly three centuries before the birth of Christ, is to be included in "Caractacus," which, as I have already stated, is to be produced by Peter Cresswell in May.

The hymn is to be used as a theme for the Chorus of Priests in the play. Its existence was unknown for many centuries until 1893, when it was found during excavations at D[illegible] by a French archæologist who unearthed a slab of marble such as was used for recording works of art in the days of ancient Greece, and upon which the musical symbols were inscribed.

Coming Events.

I promised in a recent note to give readers some brief details from time to time of forthcoming programmes for National and Regional listeners. Here are a few for the first weeks of May:

Sunday, May 1st—Violin Recital by Temianka; Orchestral Concert, conducted by Leslie Heward (Regional).

(*Continued on page* 173.)

HI, THERE! GET OFF MY CORN!

Even scarecrows have taken to radio now! This one was fitted with a loudspeaker, to which the farmer connected his set, in the hope that the constant noises would scare the birds. But, as a matter of fact, they seemed positively to like it!

"A SET YOU CAN GET THE WORLD ON."

The Editor, POPULAR WIRELESS.

Dear Sir,—I noticed in "P.W." that you said move the moderator coil about a little. I did, but that was of no use, so I took it off from where it was by the short-wave coil and placed it beside the dual range coil, 1½ inches from it and ½ inch up from the baseboard. That did the trick, and now I get any amount of stations, 35 up to now—Lisbon, a German station, Rome, Writtle, Moscow, air-stations, all on loudspeaker on the short wave. Six on the long- and 23 on the medium.

It is now 11.45 p.m. and I have just picked up Danvill, New York, playing records. W J V and W G Y on the loudspeaker (which is a Rees-Mace Cone, made for a 7-valve set). It is still coming through O.K., and I am quite excited about it, and so is the wife. It is 158 on the dial.

I am more than proud of the set, for I can say to friends, "There is a set you can get the world on." Again I thank you for such a wonderful set, and the best of luck to "P.W."

I remain,

Yours truly,

E. J. BANON.

7, Canning Place Mews, Kensington.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

ALTHOUGH—as foreshadowed in these notes some weeks ago—it was inevitable that the talks on the theatre should continue, the B.B.C. was clearly taken by surprise when lovers of the stage replied with no uncertain voice that they *did* want such fare over the ether. Now Mr. Agate has to prepare for May, and it is to be hoped that he will have got rid of that troublesome cough by then.

* * *

Philip Ridgeway's return with his parade was marked by his usual bewildering bustle, and really, a little more attention should be given to the way the chairman and some of his party rush the patter. Mr. Ridgeway is a live wire in this branch of entertainment, and so one can rest assured the hint will be considered.

Some of the singers may soon be well-known, and one turn that must have been favourably received was the singing of "As in a Looking Glass," accompanied by the human trombone.

* * *

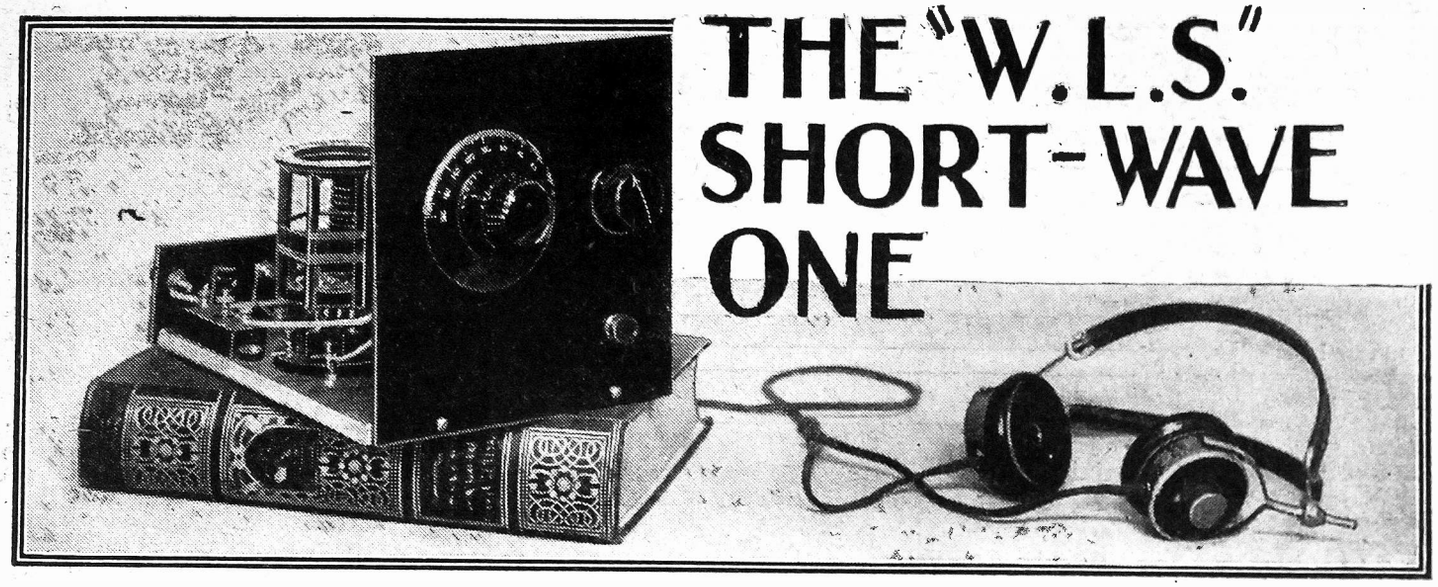
I listened the other night to the Children's Hour. It came from the North Regional Station. What curious children they must be in the North! And yet one wonders if they really are pleased with what they get.

* * *

It was doubtless intended that "The Gypsy Baron" should be the big musical

(*Continued on page* 172.)

THE "W.L.S." SHORT-WAVE ONE



READERS who are unable or do not desire to build a modern all-in set such as the "Cosmic" will find this little one-valver plus an ordinary outfit for medium and long waves an attractive alternative.

Through the medium of replies to the queries that I sometimes ask in "Short-Wave Notes," I make the acquaintance of many of "P.W.'s" more enthusiastic short-wave listeners. From the response to any particular query or remark I can judge fairly well the amount of interest that is taken in the particular subject I refer to: and that is the main reason for the existence of this single-valve short-wave set.

It is made not only for the newcomer to short-wave work (for whom it is eminently suitable) but also for the enthusiast that cannot content himself with one set, however well it works, and must always be trying out something new.

In response to numerous requests, W. L. S., one of "P.W.'s" short-wave experts, has designed a real "Hot Stuff" one-valver with a world-wide range. And in this and following pages you will find full constructional details for building this remarkably inexpensive and efficient little receiver.

Good Reasons for a "One."

As I write this I can almost hear the sound of raised eyebrows at the idea of using "a mere *one*" for any purpose. But don't be misled—there are several very good reasons for using a "mere one" for short-wave work.

Three Important "Tests."

Let me enumerate them very briefly before we begin talking real business. First of all, many readers do not feel inclined to play about with their broadcast receiver in such a way as to receive short waves on it. The family is always liable to want a particular item from the local station just as you are listening to the lions roaring in Nairobi. If, therefore, you *must* build a separate set for short-wave work, you will want it to be cheap, simple and efficient. This little set passes those three tests without any trouble.

Secondly, although the louder short-wave stations can be put on the loudspeaker with a "two" or a "three," it is the weaker ones that are the more interesting, and these necessitate headphones. If you are going to use headphones, you can do it on a "single" and still hear everything that is worth hearing.

Avoiding Background Noise.

Thirdly, the trouble about the distant short-wavers is not so much that they are *really* weak as that they are weak compared with the background noises. That being the case, you are not going to be any better off if you use lots of amplification.

In fact, the single-valver scores over all others in that particular respect—the background is as low as it can be made. This background can always be clearly *heard*; so it follows that any signal strong enough to come through the background will also be clearly heard.

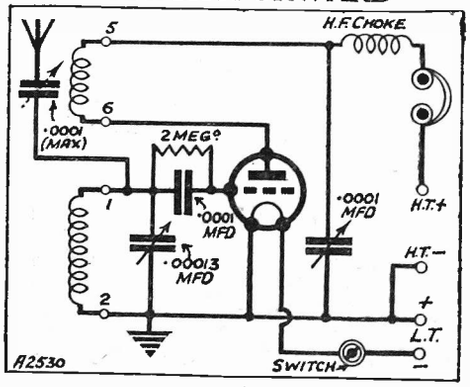
If it *isn't* strong enough to cut through it, well—you wouldn't hear it on the most

(*Continued on next page.*)

VERY FEW PARTS ARE REQUIRED FOR THIS WONDER SHORT-WAVER

- 1 Panel, 7 ins. × 7 ins. (Permcol, Becol, Peto-Scott, Ready Radio).
- 1 Baseboard, 7 ins. × 9 ins., and sheet of copper foil the same size.
- 1 Cabinet to fit (Pickett, Camco, Peto-Scott, Ready Radio, Osborn, Morco, Gilbert).
- 1 Slow-motion condenser, ·0001 or ·00013 mfd. (Ormond, Polar, J.B., Cyldon).
- 1 Reaction condenser, ·0001 mfd. (Ready Radio, Telsen, Lotus, Cyldon, Wavemaster, Graham Farish, Igranic, Polar, J.B., Ormond).
- 1 L.T. push-pull switch (Ready Radio, Telsen, Wearite, Goltone, Bulgin, Colvern, Peto-Scott, Igranic).
- 1 H.F. choke suitable for short waves (Lewcos No. 11, R.I., Wearite, Polar, Ready Radio, Telsen Binocular, Tunewell).
- 1 Valveholder (Telsen, Lotus, Wearite, Bulgin, Clix, Igranic, Graham Farish, W.B., Magnum).

PERFECTLY STRAIGHTFORWARD



- 1 ·0001-mfd. fixed condenser (Dubilier type 610, T.C.C., Ferranti, Formo, Telsen, Goltone, Sovereign, Lissen, Graham Farish, Igranic, Watmel).
- 1 2- or 3-meg. grid leak and holder (Lissen, Dubilier, Telsen, Ready Radio, Ferranti, Sovereign, Graham Farish, Loewe, Watmel).
- 3 Skeleton coil formers and one base (Goltone).
- 1 ·0001 max. compression condenser (Formodenser, Goltone, Sovereign, Lewcos, Telsen, Graham Farish).
- 1 Terminal strip, 7 ins. × 2 ins.
- 7 Terminals (Belling Lee, Bulgin, Igranic, Eelex, Clix).

ACCESSORIES.

VALVE.—H.L. Type (Mazda, Marconi, Osram, Cossor, Eta, Six-Sixty, Mullard 2DX, Tungsram, Dario).

BATTERIES.—H.T. 60-volt ordinary capacity (Lissen, Pertrix, Drydex, Ever-Ready, Magnet).

ACCUMULATOR.—2-volt (Lissen, Exide, Ever-Ready, Pertrix, Ediswan, G.E.C.).

PHONES.—Ericsson, etc.

THE "W.L.S." SHORT-WAVE ONE

(Continued from previous page.)

expensive set on the market, unless the set were equipped with an automatic gadget that stopped all commercial stations, trolley buses, vacuum cleaners and generators at a touch of the knob!

In case I might be accused of contradicting myself, let me say that a set like the "S.G.4" is intended for receiving the better of the short-wave stations reliably on the speaker, while a "single" like this is more of a set for the DX man, who wants to hear all those funny stations that are so difficult to pick up, but so exciting when you *have* got them.

Efficient Detector.

The last reason for the existence of this set is rather more obscure. If you confine yourself to a detector valve only, you have just *got* to make it reasonably efficient to do much with it. If you pile on the note-mags. you will be getting beautiful signals, but your detector efficiency may become worse and worse without your knowing it. With many two-valve short-wavers, if one were to remove the L.F. side one wouldn't have anything left at all!

As proof of that I may say that several friends and chance acquaintances who have heard my "one" have admitted that I am getting louder signals than they do on two!

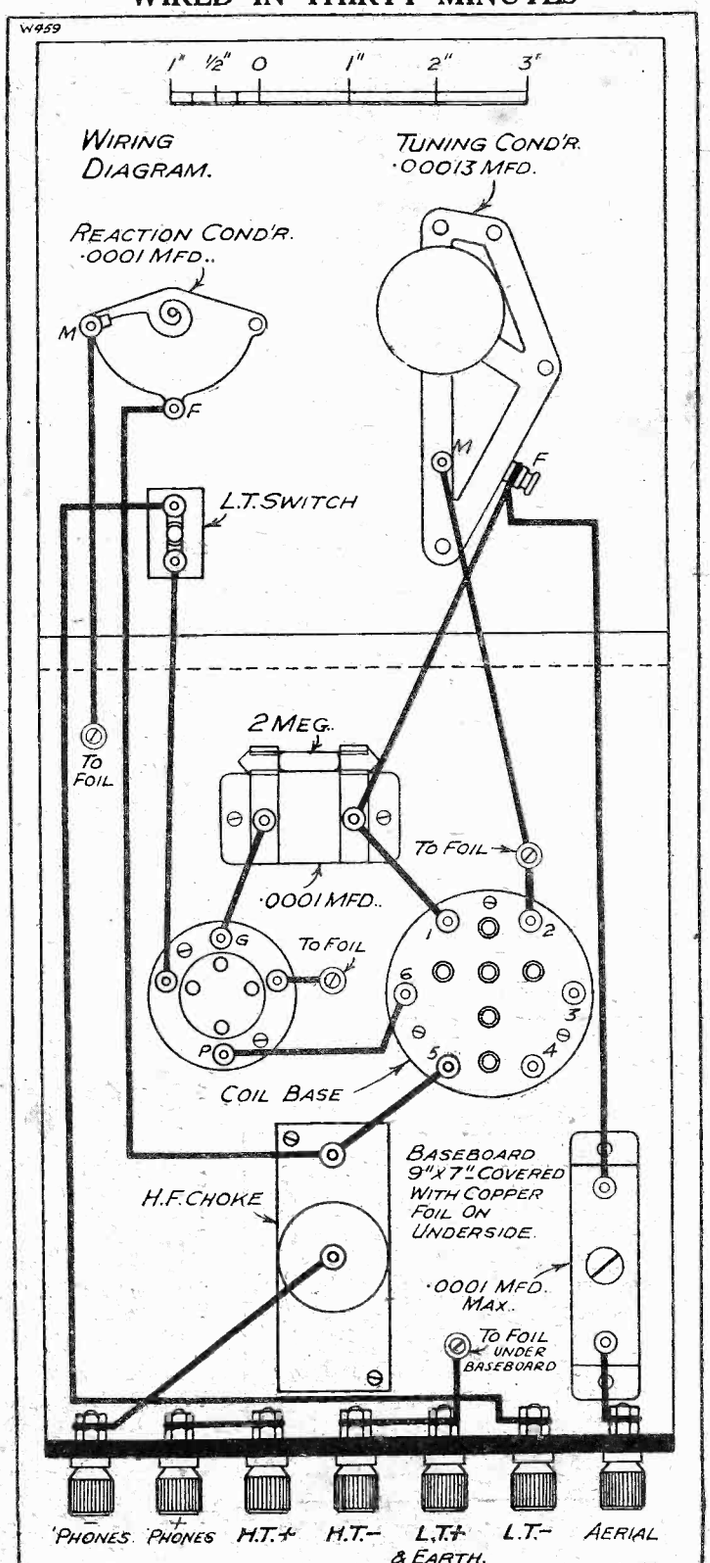
Specification.

So now we will start! The specification is as follows: Circuit, straight "throttle-controlled" variety; coils, home-made, simple but good; layout, compact but not cramped; general construction, ordinary panel and baseboard, but with copper foil underneath the latter, and all "earth" connections taken straight through to it. Aerial coupling, capacity method, using a "Formodenser." Tuning by ·0001 variable, and reaction by the usual small reaction condenser.

A glance at the photographs will show you that the set is not at all unconventional. All the important leads are very short—note the grid leads and those from the coil to the condenser that tunes it. I have used a full-size panel in case the set is to be housed in a cabinet, but the two condensers might very well be mounted on small metal brackets, thereby economising yet further and giving the set that real "experimental" appearance.

Let me add, before going further, that if you have such a thing as a low-frequency amplifier about the place, you automatically become the possessor of a loudspeaker receiver for the short waves. I often plug this little set into my radio-gramophone and shake the walls to tunes from Schenectady and Pittsburg.

WIRED IN THIRTY MINUTES



The wiring of The "W.L.S" Short-Wave One offers no difficulties even to the novice. The whole job, right from start to finish, need not occupy more than half-an-hour at the very outside. Follow this diagram carefully, and you will be sure of success.

Some Points that Count.

I can hear readers saying to themselves: "He always preaches about making the detector circuit efficient; but how does one go about it?" A sensible query, too. Well, here are some hints. First, take another look at the leads from the coil to its tuning condenser. Note, not only the shortness, but the *directness*. The condenser really *is* directly across the coil, and the tuned circuit is a compact affair. It does not include half the wiring in the set and the L.T. switch, like some I have met!

Next, the coil itself. It is wound on a skeleton former, and the actual amount of insulating material in the field of the coil is pretty small. Likewise, there is not much metal about the place, except the end of the tuning condenser, which is far enough away to be harmless.

The grid condenser and leak, too, are taken "en route" from the grid terminal to the top of the coil. And all leads that have to go to earth do so *quickly*, through the medium of a 4 B.A. brass bolt. The copper foil underneath the baseboard *is* earth, so far as a short-wave set is concerned, and it matters very little whether you connect an external earth or not. Very often you will be better off without it. For this reason no earth terminal has been provided, but L.T.+ may be earthed if desired.

How the Aerial is Coupled.

The two windings on the coil-former are the grid coil and the reaction coil. The aerial is capacity-coupled in this case because this method usually gives stronger signals, and we want the strongest possible signals this time. In a multi-valver I certainly prefer inductive coupling, and loose at that, because it is not signal strength but quietness that one is after then. Capacity-coupling is a little bit liable to increase the background noise if made too tight, but here we have it variable and can alter it to suit our own location.

I have been carefully thinking over the general arrangement of the set, and I cannot find any possible source of trouble, even to the inexperienced. The charm of a single-valver is that there is nothing to go wrong, or even to cause little bothers. It can't threshold howl—and if you don't know what that means I will not damp your ardour by telling you! Suffice it to say that it is a trouble tied up with the L.F. side of short-wavers. The detector valve is of the "H.L." class.

If you wire the set up just like the original, you will not find any trouble from hand-capacity effects, which were delightfully conspicuous by their absence! Please note that the "earth" foil is connected to L.T.

(Continued on next page.)

THE "W.L.S." SHORT-WAVE ONE

(Continued from previous page.)

positive, which is also connected to H.T. negative. The switch is in the L.T. — lead.

Now we must talk about the coils for a little. The six-pin formers used are very efficient for the job, and the business of winding is really absurdly simple. Two coils are wound on each former. The lower, and the larger of the two, is the grid coil. This begins on Pin No. 1.

Having attached your wire to this pin, you will need to cut a small notch at a point about 1 in. up the nearest "rib" to the pin. This is just to hold the first turn and prevent the whole winding from slipping down the former.

Take your wire up into this notch (which may be just a shallow hack-saw cut) and go off round the former in a clockwise direction, looking down on it from the top. If you are making the 40-metre coil, you will continue for nine turns (wound without spacing), make another notch, and lead the end of your wire down to pin No. 2.

The "Earthy" Ends of Windings.

This is, of course, the "earthy" end of the grid coil, so that the reaction coil, wound in the same direction, must begin at its "earthy" end as well.

Attach your wire to pin No. 5, crawl up through the nearest hole until you reach a point ¼ in. above the top of the grid winding. Cut your notch there, lead the wire into it, and continue just as before. For the coil we were dealing with you will need five turns, after which you cut your final notch and return the wire to pin No. 6. Pins 3 and 4 are left blank in the case of these particular coils.

All your coils are made in the same manner, with ¼ in. between the insides of the grid and reaction coils every time. "Close coupling and few turns" is the motto with these coils, and it is a very good motto where short waves are concerned.

You will probably want to cover all wavelengths from about 18 metres to 100 metres. Three coils should do this for you. "A" (18–30 metres) has three turns grid winding and three turns reaction. "B" (29–60 metres) is the one we have just talked about—9 grid and 5 reaction.

"C" should cover roughly 55 to 100 metres, and the best size for that will be 15 turns grid winding and 8 reaction. These figures will apply to 26 D.S.C. wire, but it is not vitally important that you should use that size. In any case there will be small variations in your wiring—perhaps in your variable condenser—and certainly in the coils themselves, that make it impossible for me to give you an accurate calibration for your set.

Seven Metres.

You will therefore have to find out for yourself where you are in wavelength with the help of the rough guide I have just given you.

You may wind coils of all shapes and sizes, even up on the broadcast waves, for which you will require about 60 turns grid and 25 reaction.

If you want to receive 7-metre broadcasting (when it happens!) 1½ turns grid and 2 turns reaction will do for you. This particular set works perfectly well there, and I have received signals on it on 7 metres. (Perhaps I had better add here that they emanated from a wave-meter on the other side of the room!)

So you will see that, in the language of the "talkies," it is an "all-purpose, all-pocket, all-people's set."

Use of Aerial Coupling Condenser.

One tip here may not be amiss. If you find, having made coils to my specification, that your wavelength ranges are wrong, you can alter them quite considerably by resetting your aerial coupling condenser. Generally speaking, this will need to be nearly all out. If you screw it inwards your wavelength will naturally go up.

You can only find your wavelengths by listening to everything you hear until you identify it. Then one of "P.W.'s" or "M.W.'s" many lists of short-wave stations will help you to find where you are in wavelength.

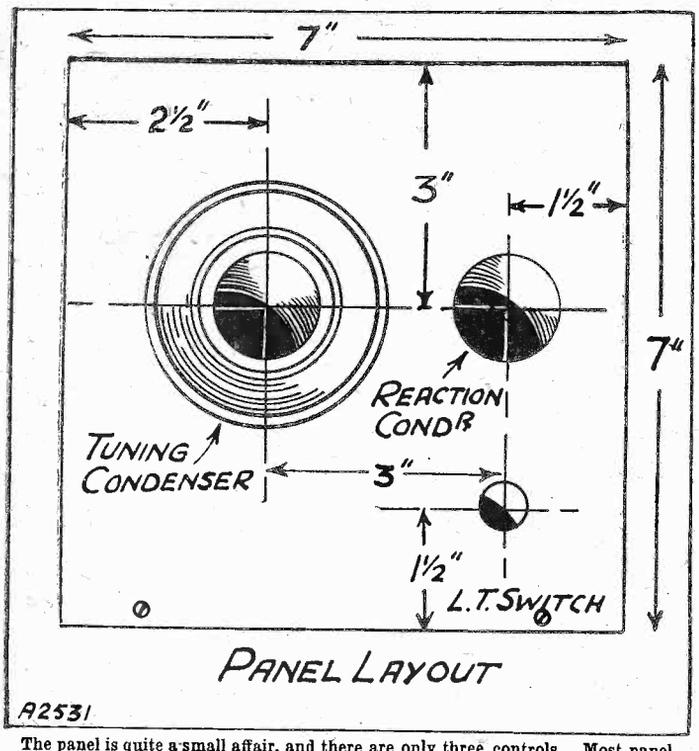
On the 40-metre coil you should receive two groups of stations. One of them occupies the band between 31 and 33 metres, and includes the G.E.C. station W 2 X A F at Schenectady, N.Y., as well as Sydney, Zeesen, and others.

The other "band" is between 47 and 51 metres, and includes some half-dozen Americans, Nairobi, Moscow, the Vatican City, and Chi-Hoa, Indo-China.

In between these two groups is the 40–42-metre amateur wave-band, occupied by innumerable amateurs of all countries, using both telephony and C.W.

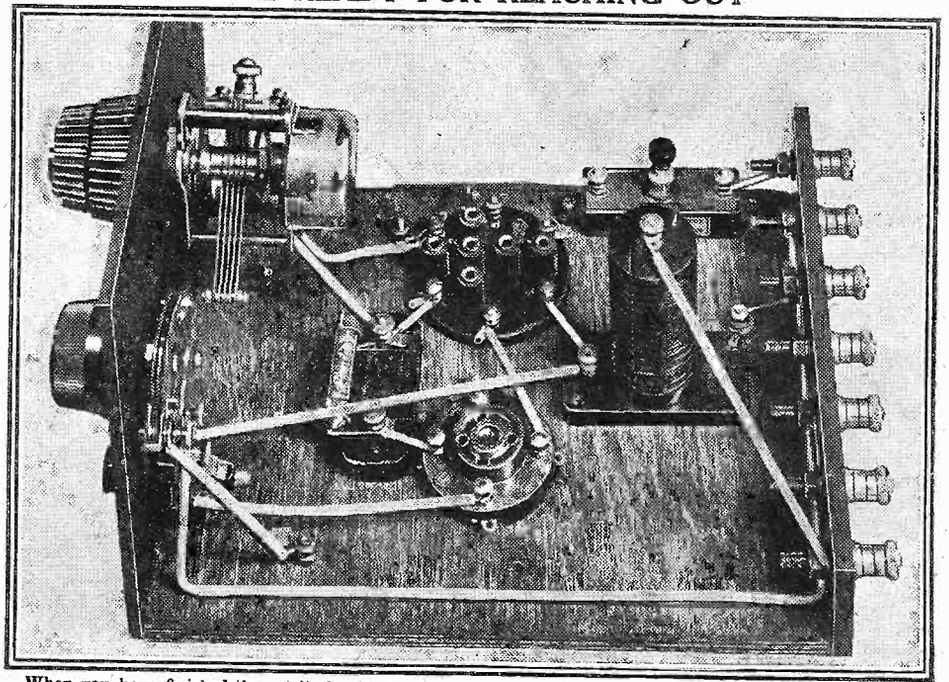
But half of the fun of short waves consists of finding out things for yourself, so I will not spoil your pleasure by telling you everything.

A SEVEN BY SEVEN PANEL



The panel is quite a small affair, and there are only three controls. Most panel components are arranged nowadays for one-hole fixing, so it should only be necessary to drill the ebonite at the places marked. All the measurements are clearly indicated.

ALL READY FOR REACHING OUT



When you have finished the set it should closely resemble the original model, which is illustrated above. This photograph will also give you a good idea how the wiring is spaced out, a most important point in a short-wave receiver.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

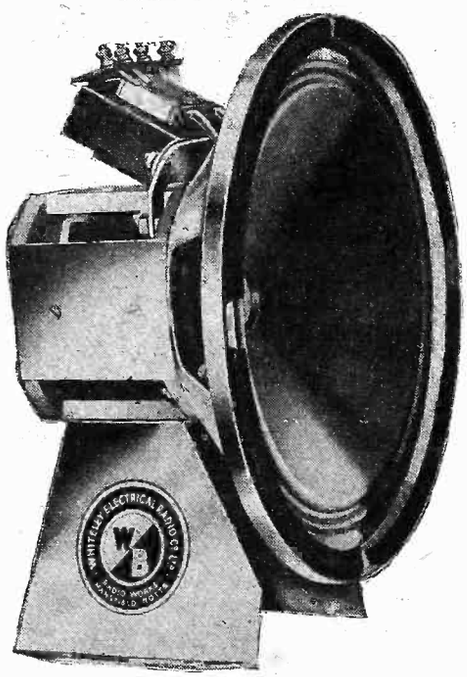
AN INEXPENSIVE "M.C."

I SHOULD think we have arrived at the very rock-bottom of values in loudspeakers as a result of a coincidence in abnormal low price levels of raw materials and improvements in manufacturing technique. Anyway, I cannot visualise any further price reductions, without sacrificing quality, for a very long while to come.

And none of these inexpensive m/c's. (under £3, say) is equal to the bigger and more expensive ones. But they are good—very good indeed, and definitely are worth buying.

To revert to the W.B. P.M 4, this is an honest proposition and does give good results, results which will, I anticipate, cause it considerable popularity. It is sensitive and can be used with advantage on almost any kind of set. But endeavour to hear it yourself in comparison with other speakers in the same price class.

THE NEW W.B.



This is the P.M.4 W.B. Permanent-Magnet Moving-Coil Loudspeaker.

A good example of modern loudspeaker value is seen in the new W.B. Permanent-Magnet Moving-Coil Loudspeaker, which sells, in chassis form and complete with an output transformer, for 42s. One used to pay that for a pair of headphones not so very long ago!

But, you may well ask, are those low-priced speakers really moving-coil speakers, or do they carry such a description merely by courtesy?

Well, they really are moving-coil loudspeakers, but you must not get the idea that "moving-coil" implies a standardised performance. It doesn't. There are as many "quality" differences in moving-coil speakers as in any other type—more so if anything.

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.

A SUPER ADAPTOR.

The "Eelex" Short-wave Adaptor operates on the super-heterodyne principle and is one of the simplest devices of this kind that is available in commercial form.

It is designed to cover a 16–60 metre wave-range and to 'super' at a wavelength of 1,100 metres. There is only the one tuning dial and the reaction adjustment remains practically constant over the whole band.

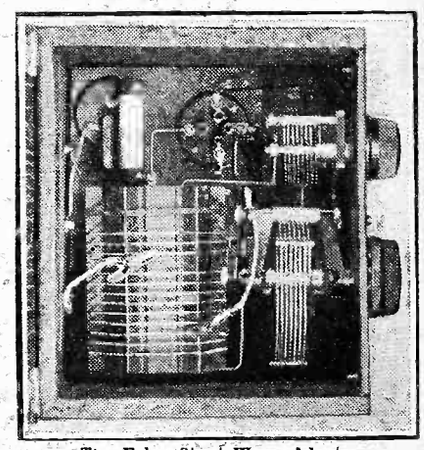
There are no complications in applying the unit to practically any set, for the existing batteries can be used. And I should mention that only recently the unit has been considerably improved.

It costs £3 for the battery model, and £3 5s. for the A.C. model. On test we found it to handle very pleasingly. The controls are flexible and searching is simpler than with the average adaptor of ordinary design.

COILS FOR THE "COSMIC."

The two coils which were especially designed for our now-famous "Cosmic" set, have proved so satisfactory that they are to be adopted as standard "P.W." components. Thus they will be used

FOR SHORT WAVES



The Eelex Short-Wave Adaptor.

separately or together in various future sets as well as in "Cosmic" constructions.

The dual-wave coil, which covers medium and long-wave stations can, of course, be employed in any ordinary receiver, while the short-wave "Cosmic" coil is also "universal" in its application.

So traders should note that both coils will no doubt remain current well into the next "season." They may even run into 1933, for we are not contemplating any new coil designs. (The same applies to the "Moderator" Coil.)

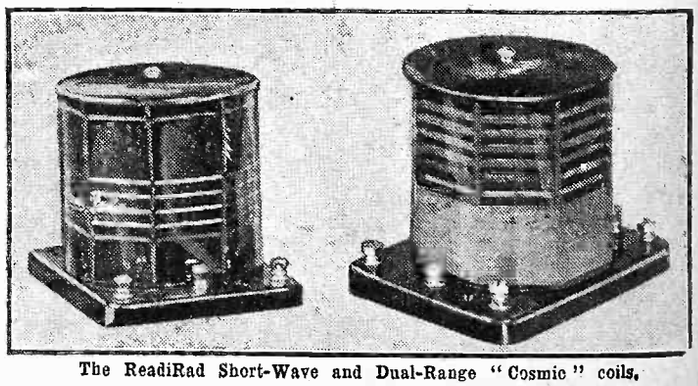
That the industry has already recognised the merits of these "P.W." "Cosmic" coils is obvious from the number of reputable manufacturers who are making them.

Among the first to go into production were Messrs. Ready Radio, Ltd., and their coils form the subject of the illustration on this page.

They are made in exact accordance with the official "P.W." specification, and are robustly and cleanly finished. Readers can embody them in their sets with every confidence that they will get full "Cosmic" results so long as all the other gear and connections, etc., are of an equal standard.

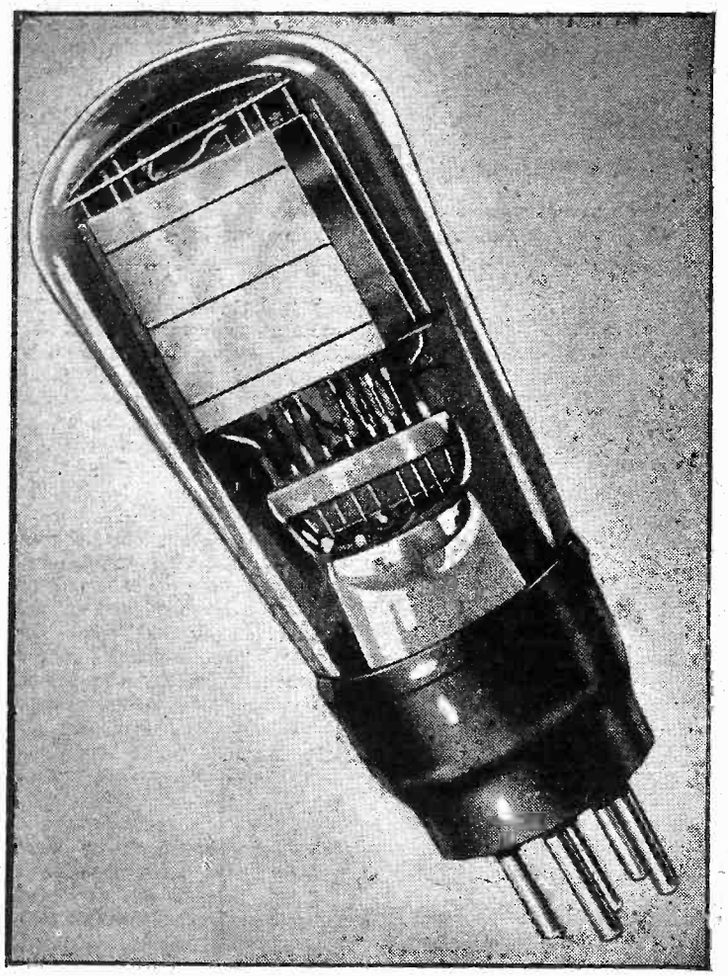
The price of the Dual Range type is 6/6 while the short-wave lists at 4/6; only 11s. for complete three-band tuning.

ALL THE WORLD ON ONE DIAL!



The ReadiRad Short-Wave and Dual-Range "Cosmic" coils.

THE NEW LOW CONSUMPTION HIGH EFFICIENCY PENTODES



★FOR THE MAN WHO USES BATTERIES

PEN 220

Here is the solution to the output stage problem in battery operated receivers. The Mazda Pen 220 gives an astonishingly high undistorted output for an anode current of only 5 m/a. It is the ideal output valve for portables.

PRICE 17/6

★FOR THE MAN WHO HAS AN ELIMINATOR

PEN 220A

A valve which delivers a huge undistorted power output for an anode current of not more than 18 m/a, the Pen 220A needs only 150 volts on the anode and can be made to give excellent results with 120 volts and a current of only 12 m/a. It is undoubtedly the valve for the man who wants really magnificent volume for the operation of large moving coil speakers.

PRICE 17/6

Mazda Valves are 100% British made and designed by British engineers.

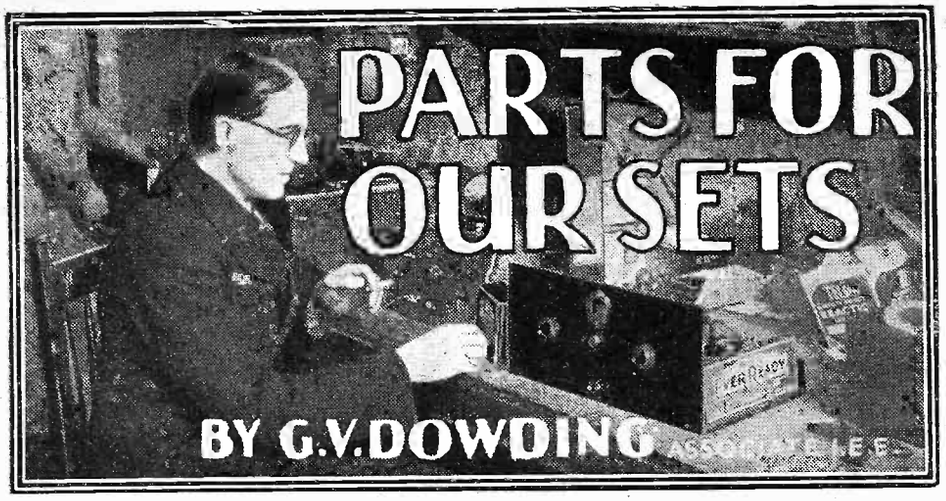
The amazing

MAZDA THE BRITISH VALVES

EDISWAN RADIO

The Edison Swan Electric Co. Ltd. (AEI Associated Electrical Industries Ltd.) 155 Charing Cross Rd., London, W.C.2

V.147



An explanation of the policies which guide the compilers of "P.W." component lists.

"WHY do you always list about six makes of every component in your components list?" asked one of my correspondents recently. And he went on to suggest, what is perfectly true, that there is a "best" in everything, and added that he thought we could serve constructors better if we listed only one make of each part—the make we considered superior to all the others.

From some points of view it would be very nice if we could do this. For example, it would make it possible to provide lay-out dimensions.

But there are serious objections. In the first place it must be remembered that "P.W." has an enormous circulation, the largest of its kind in the world. And as was revealed by those letters from advertisers which were published in "P.W." a few weeks ago, "P.W." also, and not surprisingly, has the greatest home constructor following.

Now what does this imply? Obviously that a "P.W." set design will inevitably be copied by tens of thousands of enthusiasts and that the components figuring in it will meet with a very considerable demand.

So we always endeavour to design our receivers with as few specialised parts as possible in order that the risk of shortages of supply are reduced to a minimum.

Of course, it does happen now and then that a manufacturer produces something which so excellently fits in with some scheme we are developing that we should be doing our readers a serious disservice if we too rigidly adhered to a policy of "alternatives at any cost."

The "Sold Out" Bogey.

In such a case we approach the manufacturer concerned beforehand in order to obtain his assurances that he would be able to cope with really big business in his new line.

Should he not be able to guarantee quick deliveries on a large scale, then we regretfully have to turn our attention to something else.

I well remember that some two years ago a firm placed a gadget on the market which identically coincided with one of our current requirements. It was in the nature of a missing link in a receiver design that would have been impossible without it.

We invited the Managing Director of this concern to a conference at which he asserted he could meet any demand. And I must say that the details which he supplied regarding his factory resources were most impressive.

Keeping Down the Cost.

But it so eventuated that the particular "P.W." set in question was a rather bigger success than usual, and although the firm manufacturing the component for which there was no alternative make then available actually exceeded the output guaranteed, the demand easily beat his supply. New machines were installed, but even then it was only with difficulty that the firm was able to cope with the business, and complaints from constructors to the effect that they were unable to purchase the article continued to reach us from all over the country for quite a long time.

That taught us a lesson we haven't forgotten, and ever since we have tried to increase rather than restrict our "alternatives" in component lists.

Quite apart from the question of "easy-availability," there is another aspect to the subject, and that is the vitally important one of costs.

Many constructors have numbers of components in their possession, and the more of these which can be used for a new set the cheaper that new set is going to be.

Again, prices of components vary widely, and it is our opinion that "P.W." constructors have sufficient discrimination to be able to cut their radio cloth to suit their purses.

There are, for instance, L.F. transformers which catalogue at round about one pound, whilst others list at only half (or less) that figure. If we were always to specify the "best," our sets would always be fairly expensive instruments. Nevertheless many of the less costly components are excellent value for money, and as regular readers will know, we frequently give advice as to those items which they should spend the most money on if they want the greatest all-round value as judged on a cost-results basis.

I must make it plain, too, that our components lists are not haphazard selections from catalogues or mere complements to our advertising pages. A particular make must reach an adequate standard of efficiency and must be technically suitable for the set for which it is specified before it can be included in such a list.

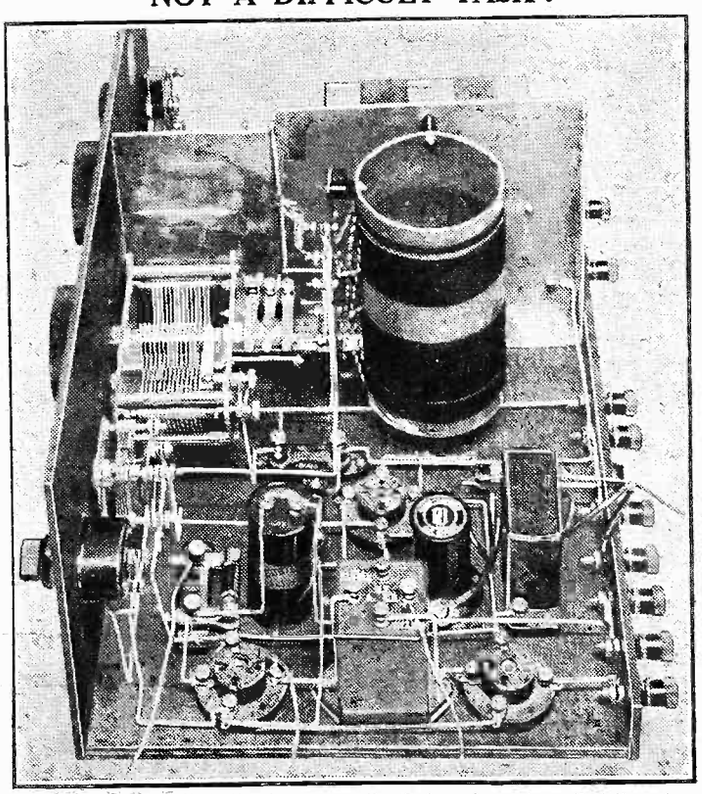
Development and Production.

Further, it is not our practice to build around prominently advertised articles. Our invariable procedure is as follows. A circuit is cafefully developed in the Research Department, and when it has reached the "production" stage, and not until then, we survey the market for suitable components.

It should also be noted that we do not turn out sets in accordance with a predetermined schedule: when we have something really worth the attention of constructors the appropriate constructional article appears—not before. It never has been the policy of "P.W." to issue practical versions of text-book circuits at dated intervals.

Looking back a month or two from the time of writing, I see we have given you details of only the "P.W." Eckersley sets, the "Cosmic" and the "P.W." "Single Dial Super," and you must agree that all these have original features of worth-while characters. As for the future, all I can say about that is "wait and see," for prophecy in radio is particularly dangerous!

NOT A DIFFICULT TASK!



It is not a difficult matter to arrange the design of a set so that there is latitude for components of different shapes and sizes. As a matter of fact, to do so results in the incidental advantage that there is less tendency towards an inefficient crowding—a fault encountered in many commercial designs.

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.

Do Condensers Condense?

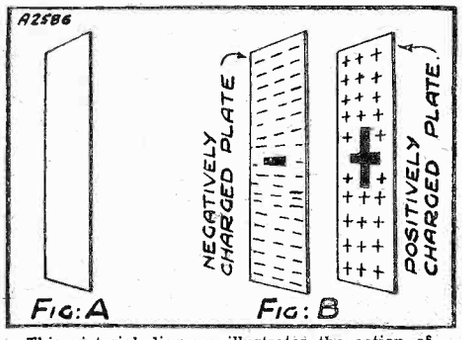
B. P. (Tring).—"I do not understand why a condenser should be so named. What does it condense?"

If you hang up a flat plate of conducting metal and fill that plate with electrons, you are said to make that plate negatively charged.

Fig. A shows the plate. Now I have taken away a lot of electrons from a second insulated plate, which is said to be then positively charged. I bring the two plates near to one another, Fig. B.

Now (+) attracts (−) so all the electrons in the first-mentioned negatively-charged plate concentrate upon the surface of the plate, attracted towards the positive plate. So the bringing of the two plates near to one another—one negative the other positive—has condensed the charge upon the surface of the plates.

WHAT HAPPENS INSIDE IT?



This pictorial diagram illustrates the action of a condenser when the plates are charged.

The term condenser was invented in the early days of electricity long before wireless came. It has remained with us.

A condenser exists in a wireless set as a component of an oscillating circuit designed to allow that circuit to oscillate at a frequency determined by the value of the condenser, that is by the strain of the charges pulling towards one another in the surfaces of adjacent plates.

The strain value is varied according to the area of the plates which are actively facing one another.

* * *

Enamelled Wire for Aerials.

N. K. (Chatham).—"Why is it that enamelled-covered wire is sometimes used for aerials? Doesn't the covering of enamel stop the wireless waves from being received?

"I ask this question because I am putting up a new aerial, and I have been told that it will pay me to buy the covered wire in preference to ordinary bare copper."

Enamel? Does enamel conduct? If enamel *does* conduct, then the high-frequency currents will be set up in the enamel and not the wire—all H.F. currents flow on the skin of a wire.

If enamel does *not* conduct, then the enamel will not shield the wire—only conducting materials shield electric forces. If it's half and half, you get a beastly high-resistance aerial.

In fact, enamel (*good* enamel, that is, not that lampblack stuff) does *not* conduct, and therefore does *not* shield. It, of course, is useful in protecting the wire from chemical action due to the dirt- (and salt-) laden air.

* * *

Earthing the Pick-up.

J. M. D. (Belfast).—"I have recently constructed a three-stage amplifier which was very unstable. When, however, I joined L.T. neg. to earth, it was reasonably stable. Complete stability was, however, only achieved when one side of the pick-up was earthed, but this shorts the bias to the first valve. Can you make any suggestions? Would an input transformer solve my problem?"

I cannot expand my answer much, but all I wanted to write was "yes." May I leave it at that? Or surely a condenser would help, as indicated in the sketch.

* * *

The Height of An Aerial.

R. D. (Dundee).—"My aerial is 25 ft. high. If I increase the height to 50 ft., will I get double the volume?"

This all depends upon a number of factors not given. For instance, if an aerial and inductance coil had no wasteful resistance, an aerial an inch high would be as effective as one 1,000 ft. high. It is radiation efficiency, which counts.

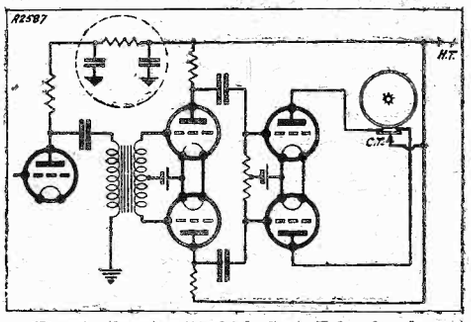
By doubling the height of a typical broadcasting aerial the radiation efficiency might be increased 20 per cent, and you might notice an increase of volume thereby, particularly with crystal sets. With valve sets the same change might not be noticed.

A Serious Snag When Receiving Loud Music.

N. M. L. (Southend).—"In a receiver incorporating two highly efficient small power valves in push-pull in the last stage I have struck a serious snag. When receiving loud sustained passages the set, apparently, goes into oscillation, and after an interval of a few minutes the anodes of the power valves appear to be getting almost red hot.

"If, when the apparent oscillation occurs one of the power valves is removed the receiver stops oscillating, and results are quite good in every way. I should be pleased to know the cause of the trouble and the best way of trying to cure this?"

PUSH-PULL FOR STABILITY



Here is the circuit which Capt. Eckersley draw to illustrate his reply to N. M. L., a Southend reader of "P.W." It shows a detector transformer—coupled to two L.F. valves in push-pull, with these in turn resistance-coupled to push-pull output valves.

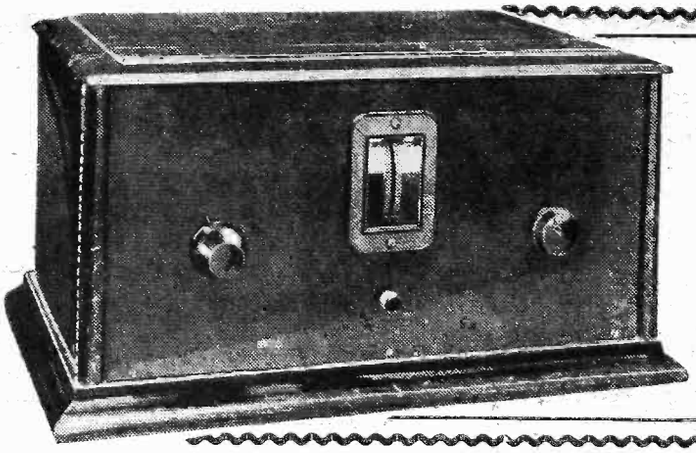
This is very difficult without a circuit diagram or description. What are the two preceding valves, what the power supply, what the method—transformers or resistance capacity, etc., etc?

In general, I say decouple, although really push-pull should eliminate this necessity.

But say, in general, the circuit is as shown, then in the detector circuit insert the decoupler as I have shown it. If there is no penultimate stage, then do the same, or if there is one try the decoupler in that stage.

If using an eliminator be sure it is powerful enough, or if a battery, be sure it is of low internal resistance. You might try reversing a transformer before you try decoupling.

Certainly, a push-pull system should not require decoupling, but the detector is, of course, not push-pull.



HOW TO CONNECT UP THE ECKERSLEY A.C. TWO.

By the "P.W." Research Department.

Last week constructional details were given of this all-from-the-mains receiver, and below you will find instructions for connecting it up to the power supply, and also how to use it on batteries if desired.

THERE are nine terminals on the terminal strip, the connections for four of which are obvious, namely, the aerial, earth and loudspeaker. So we have five others to consider.

First of all, let's assume you have an H.T. mains unit that has no L.T. A.C. output. The connections to H.T.— and the two positives are easy. Put the maximum, about 150 volts or so, on plus 2 and take plus 1 to a variable tap or to about 80 to 100 volts.

Suitable Mains Units.

So long as the unit will give at least about 25 milliamps at the above voltages it is O.K. For the filaments you must buy a transformer, with a voltage output of 4.

An amperage output of 2 is required for this set, but as one costing only a little more can be obtained which will give 3 or 4 amps. you may be tempted to buy one. Certainly you never know when you may want to go in for more valves on the mains, but such a transformer is only suitable if it is a very good one with excellent regulation. Otherwise the voltage across it may rise too much when only taking 2 amperes.

Two flexible wires should be wired in parallel to those that go into the mains unit adaptor plug, and the two secondary ones go to the L.T. terminals on the receiver. Neglect the centre tap if there is one.

Cutting Out Hum.

When you come to use the receiver, set the slider on the 30-ohm potentiometer about half-way and if you are troubled with hum try moving it one way or the other. You may do this while the set is working if you are very careful and employ a wooden handled screwdriver.

If your mains unit has A.C. L.T. output terminals, use these instead of a special, extra transformer, connecting up in just the same way. But should you find on adjusting the potentiometer you cannot improve matters (always supposing there is a hum to get rid of) it means that the centre tap of the secondary of the filament winding is already joined to H.T.— in the unit.

In such a case you are unlucky, and must either put up with the hum, get the makers of the unit to alter it so that the centre tap is unconnected, or else ignore the terminals and use a separate transformer in the manner already described.

If you do not already possess a mains unit, then you simply buy one of the type mentioned in the list of accessories. This is entirely suitable for the receiver, and has the L.T. terminals on it.

It is a unit well worth purchasing as it has an output around 50 milliamps and will serve for much larger sets than this one, and you do not know what you may require in the future.

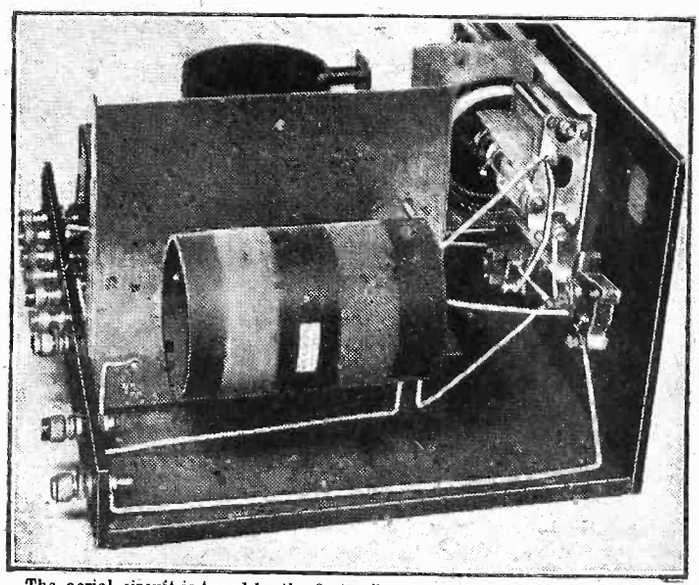
And now about using the set as a battery receiver. These are the alterations that have to be made.

Modifying for Batteries.

Disconnect the two leads that go to the ends of the potentiometer, and join the L.T. battery across the two L.T. terminals. Join H.T. negative to L.T. negative and also the positive of a grid-bias battery. Now disconnect the bottom of the two meg. grid leak from the 2-mfd. fixed condenser and take it instead to the positive filament terminals of the V1 valve holder.

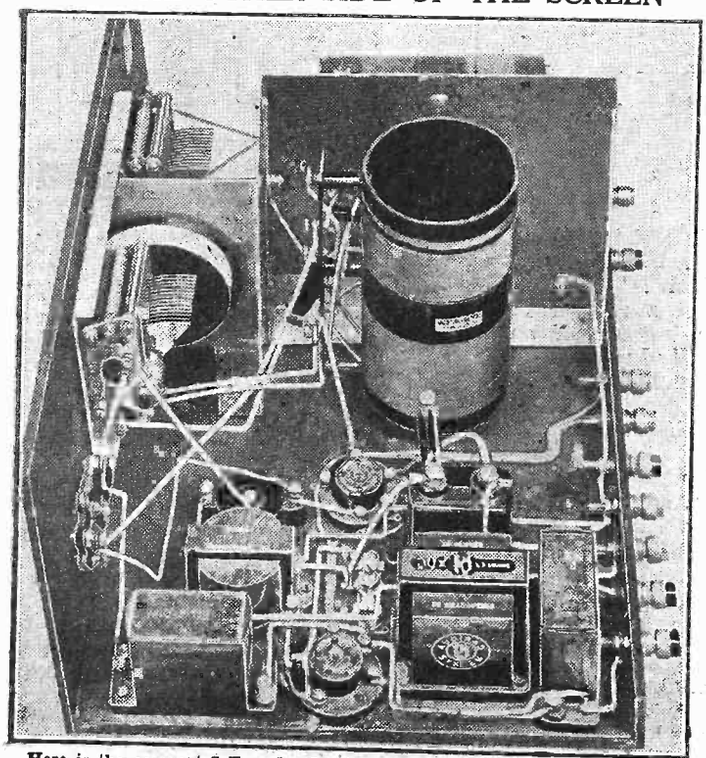
Also disconnect the three leads that go to G.B.— of the transformer from that terminal, but leave them joined together, and take the terminal instead to a suitable negative tap on the grid-bias battery. That's all.

WHERE THE SIFTING IS DONE!



The aerial circuit is tuned by the first coil and condenser, the currents being passed on to the second coil and condenser by the resistance incorporated in the coil unit.

ON THE OTHER SIDE OF THE SCREEN



Here is the compact L.F. end. On the right of the second valve is the output choke and condenser, and to the left of it the L.F. transformer and a by-pass condenser.

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.

CHANGEABLE weather nearly always brings a crop of atmospherics in its train whether or not thunderstorms actually occur. At such times the atmosphere is in a disturbed state, accompanied often by large and quite sudden changes in the pressure of the air. Electrical discharges, some large, some small, are continually taking place in such circumstances and these provide the crackles and bangs which issue from our loudspeakers.

We must expect periods of varying length during the spring and summer when atmospherics are somewhat troublesome, but expert long-distance men know a variety of ways of dodging their effects. You will generally find that interference, when atmospherics are about, is at its worst on the long waves; and reception of the long-wave stations may not be worth while.

Dodging Atmospherics.

Again, you may find that crackles are louder and more frequent at the bottom of the medium wave-band than in its middle and upper parts. This happens because with your tuning condensers at very low settings there is only a small amount of parallel capacity in use. The damping is therefore quite low, and undamped wave trains, such as those produced by atmospherics, are at the top of their form when introduced into tuned circuits of low damping. In atmospheric weather, then, the happiest hunting-ground will usually be the wave-lengths between 300 and 550 metres.

There are other ways of dodging atmospheries. One of these is to change over from outdoor to indoor suspended aerial; another is to make use of a frame. The frame is not particularly susceptible to this kind of interference and, since atmospherics generally come from one well-defined direction, it is often possible, by making use of the frame's directional properties, to receive numbers of stations free from interference.

One of the soundest methods of atmospheric dodging is to bear in mind that the crackles will not be a nuisance so long as the strength of the wanted transmission is considerably in excess of this kind of unwanted natural broadcasting. Go, therefore, for the most powerful stations, and do not bother about their weaker brethren.

Bordeaux and Hilversum.

An outstanding station just now on the medium waves is Bordeaux. He is now quite free from interference, and his strength is remarkable. There are in fact two stations, one on either side of the North National, which are providing wonderful reception, Bordeaux and Hilversum. If you live near the North National, try for them at times when your local station is silent.

Heterodynes have been rather prominent below 275 metres, but Bratislava, Heilsberg and Turin are generally free. Gleiwitz, Trieste and Nuremberg are always worth attention, and there has been of late a good deal less interference from Morse spark signals. Lodz has been coming in very well on several nights. His wave-length is 235 metres, but his transmission times do not yet seem to be fixed and definite. Try for him rather late in the evening.

Some Useful Alternatives.

Vienna, who until recently had been rather uncertain, has shown a remarkable return to form, good reception being possible night after night. Budapest has been very much better than of late, and Munich has given good loudspeaker results on several occasions. Brussels No. 1 I nearly always find good, and the same applies to both Prague and Langenberg. Stockholm is suffering from temporary weakness, but Berlin Witzleben is very much stronger than he has been for some time.

Belgrade, too, is often to be heard at fine strength. Just below Belgrade, Moscow Stalin is coming in so powerfully that he completely drowns any interference that there might be from Spanish stations sharing the same wave-length of 424 metres. Unfortunately, Moscow's ideas of entertainment run mainly to propaganda talks!

SHORT-WAVE NOTES

News and views regarding an exciting and fascinating waveband.

WHEN conditions are dull—as they have been of late—I can generally find something exciting among my correspondence. But this week the more fiery of my readers have let me down, and I can find nothing but polite letters asking for information.

"L. V. M." mentions reception on about 21 metres of "W X 2 C J." I presume he means W 2 X C J, which is one of the latest of the Rocky Point stations. The station is testing irregularly at present, but is generally very strong.

On 31·35 Metres.

"M. S." (not of Harlow this time, but from Warwickshire!) writes about his adventures on short waves with the "Magic" Two. He is afraid I shall scoff at him for using a set that is so "out-of-date."

Not at all, "M. S." The best set for you to use is one that you like, whatever the claims to fame of more recent receivers may be.

Judging by at least half a dozen letters on the subject, W 1 X A Z (31·35 metres) has either increased power or taken a new lease of life by some other means. He appears to be coming over better than W 2 X A F at present. E A Q also figures prominently in the list of consistent stations, while Radio Maroc seems to be heard by everyone with a receiver that works!

The S.G. Four in India.

"D. E. R." (Luton) uses a "Magic" Four de Luxe on short waves, but finds that he gets on better without the H.F. stage below 100 metres. There's certainly something wrong there, "D. E. R.," although you mustn't expect *too* much from it in the way of amplification. It is more in other directions that the H.F. stage usually helps.

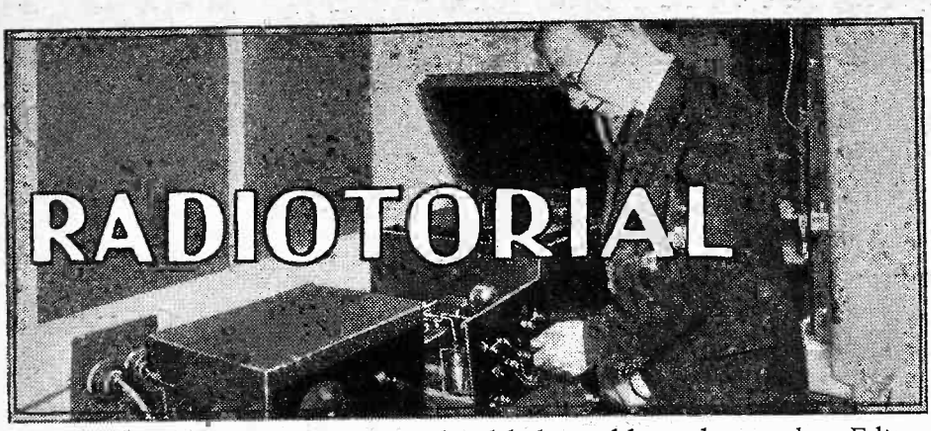
The latest recruit to the "H. A. C."—somewhat delayed, I am afraid—is our friend J. R. B. of Edinburgh. Since he is too bashful to give me his name and address I cannot enter him on the official roll, however.

I am glad to see that the S.G. 4 has found its way as far afield as Peshawar, where Capt. P. J. Fletcher appears to be making good use of it. In spite of trouble with atmospherics, India appears to be a good location for short-wave sets, and, of course, it is well served by stations that are not so far distant as they are from us. Chi-Hoa, Bandoeng, Sydney, Nairobi, and the Russians are all within reliable distance!

A Fine Log from Essex.

"H. M." (Essex) writes me his first letter, having been "C. B." as the result of a chill. During the period he has compiled a fine log that indicates that there is not much wrong with conditions at present. He also mentions a scheme for an atmospheric-eliminator at the L.F. end of the set, which I believe is a sound plan, although the theorists won't have it.

In conclusion, he asks for "pages and pages" of short-wave notes instead of the present amount. Yes, "H. M.," but don't forget that we short-wavers are still very much in the minority. All the others would feel hurt if we trespassed on their space *too* much.



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

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

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

QUESTIONS AND ANSWERS

TESTING FOR A BREAK.

Mrs. G. (Wimbledon).—"Although I made the set myself I felt quite helpless when it went wrong, and it was rather humiliating to find after doing without wireless for a week that the only trouble was a faulty H.F. choke connection. The boy who came to attend to it found this out at once with a pair of telephones, and although he explained how it was done, I am still not quite clear how to do a test of this kind, and should be glad of some information on this point."

Defects arising from faulty components, may often be detected by a pair of 'phones and a dry cell. One tag of the 'phone should be connected to one terminal of the dry cell and two flex leads should be connected, one to the remaining 'phone tag and the other to the remaining terminal of the dry cell (a flash-lamp battery is quite satisfactory).

These two flex leads, if touched momentarily together, will produce a strong *double* click in the 'phones—one click when they make contact with each other, and another when they are separated again. They may thus be used for testing for continuity in leads, etc., since the loud double click is ample evidence that everything is satisfactory.

A fault on the coil holder, for instance, such as a break between the terminal and the plug or socket to which it is connected, may now easily be detected, since if one flex lead is connected to the terminal and the other to the side of the holder to which the terminal should make connection, absence of the double click is positive evidence that the component is faulty.

On the other hand, if one of the flex leads is connected to the socket of the coil holder and the other to the plug, if a double click *is* heard, there is a short-circuit across the holder.

Similar tests may be made with valve holders, both for testing for a connection between each terminal and its socket, and for testing for short-circuits between the sockets.

Variable *condensers* may also be tested by this method, a short-circuit between the plates giving rise to the usual double click, which should *not* be present in the usual way.

It is, of course, essential to see that all leads are removed from the components under test, and that no coils are in position in coil sockets when these are tested.

Complete circuits may be tested in a similar manner.

WHO WAS KICKING THAT GONG AROUND 1400 METRES?

R. A. L. (Birkenhead).—"As the set is only a 'two' I had not bothered about long-wave reception before, except to try occasionally for Daventry, Paris, and also one foreigner just underneath Paris, which a friend identified for me as Warsaw. Thinking I might bag this one again, I tried on Sunday night, and to my surprise picked up a station a bit lower down on the dial.

"It was ringing a gong, very fast, and afterwards, I heard a man and a woman announcer, but could not get the name of the station. Unfortunately it closed down just after ten. Could you tell me what station this could have been?"

Probably it was Motala, the long-wave Swedish station which relays Stockholm. The wavelength in this case is 1348 metres, which would bring it a degree or so below Warsaw on the dial.

By the way, we think you are doing wrong in neglecting the long waves, for probably there are several other stations you could pick up, for instance Kalundborg, which is a little lower down than Motala, and which is very often picked up in this country on a two-valve receiver.

THE COUPLING CONDENSER.

H. T. (West Worthing).—"For the band-pass filter coil which I am using, the makers recommend a ·04-mfd. condenser of the non-inductive type. I have been working this for some time, but recently, when investigating a crackle, I thought that the condenser had been causing the trouble, and finally replaced it with a ·02-mfd. condenser which I had on hand.

"It did not cure the crackle (which subsequently proved to be a spaghetti resistance), but what it did was to improve signal strength on practically all stations enormously. It is so much better than the ·04 that I have left it in position, and I have been wondering why there should be such a great improvement?"

The degree of coupling between the two halves of the band-pass arrangement depends upon the capacity of the condenser in question, and by reducing that capacity you have greatly increased the coupling. The value used by the makers is generally chosen very carefully to give the correct degree of coupling combined with selectivity to produce the flat-topped band-pass response over the unit as a whole.

You have thrown this careful matching effect out completely by using a different value, and apparently your local conditions are such that the accompanying loss in selectivity is not troubling you. For a listener living "close under a local station" such a change would probably be noticeably for the worse, and we expect that even in your situation you will be able to verify the fact that the tuning is now double humped because of the lower coupling capacity used.

If you place a milliammeter in the plate lead of the detector, and then slowly tune the aerial band-pass through the carrier-wave of a reliable station, you will probably notice that the meter shows *two* distinct tuning points, close together, which represents the double hump; and if the ·04-mfd. condenser were to replace the ·02 condenser now used, these two humps would vanish into the more or less flat-topped response which is the idea of the band-pass circuit.

It is not so easy to detect the humps by ear as it is by a milliammeter in the detector plate circuit, as the ear is not at all sensitive to changes in volume and cannot detect quite large variations.

TIPS FOR TESTING.

Here is an interesting letter on the above subject, from W. J. A. G. (Purley):—

"As a regular reader of POPULAR WIRELESS, I think one of the most interesting of odds-and-ends is the occasional corner devoted to such things as 'Tips for Testing,' 'Hints for Tuning,' etc.

"In the issue of March 5th I read those on page 1485, and when I read the last I determined to write to you, as I have found that even when a set fails on radio reception, the mere switching to gramophone is not an infallible test.

"I have built your set—the 'Three Pound' Three—and have inserted a gramophone pick-up in the detector circuit, in the lead between the grid condenser and the grid of the detector valve. One day, on switching on to radio, there was no result. During the previous day or so we had heard several crackling noises, but put that down to atmospherics.

"On switching on to gramophone, however, results were good, but not up to strength. After several tests the fault proved to be in the spaghetti resistance. This was replaced, and results as usual.

(Continued on next page.)

HOW ARE YOUR RESULTS NOW?

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

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

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

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

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

TECHNICAL TWISTERS

No. 109—THE OUTPUT CIRCUIT

CAN YOU FILL IN THE MISSING LETTERS?

The loudspeaker is generally best connected direct in the last valve's plate circuit, as a separate output circuit for it offers several important

* * * * * * * * * * *

* * *

Among these are the possibility of correctly . . . . . the loudspeaker and valve impedances, and the shortening of the circuit through which the . . . . . current flows.

* * *

The . . . . . may be done by means of a tapped . . . . . or by a . . . . . of suitable . . . . .

An advantage of an output filter is that it tends to . . . . . the decoupling arrangements.

Last week's missing words (in order) were: Bass. Air. Low. Thick.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from previous page.*)

"Switching over to gramophone proved a waste of time, as I was put off the scent thinking that the dual coil must be at fault, or the aerial. Apparently, when radio refused to come through, the spaghetti was not completely broken, but in moving it during tests it got completely broken because in the end there were no results at all, even on gramophone. Some people might not have moved the flexible resistance, and thus they would have searched a long while in vain!

"I leave you to make any use you can of my little hint about not absolutely relying on the gramophone test."

In the Tips for Testing, given on page 1485, it is stated: "Radiogram users should remember that when a set fails on radio reception, the mere switching over to the gramophone will show whether or not the fault is on the low-frequency side."

Within the limits of a brief statement this is substantially true, and W. J. A. G.'s letter raises an interesting point about such rough-and-ready tests.

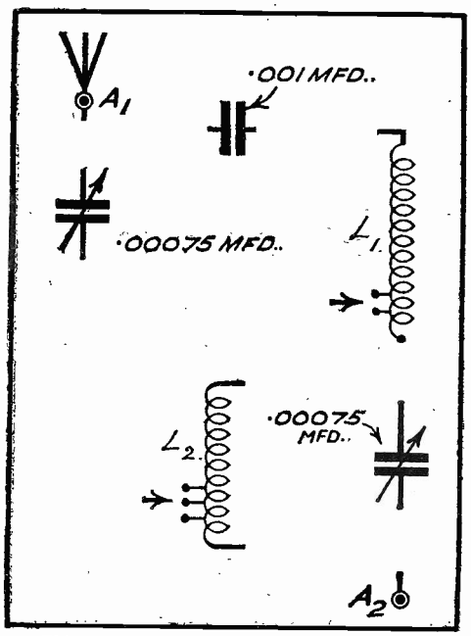
He says that on switching to gramophone, however, results were good but *not up to strength*. This latter was an important fact, and it clearly proved that the fault was *not* switched out of circuit on the gramophone side; in other words, there was some sort of trouble on the L.F. side to account for the fact that results were not up to strength.

The input from the gramophone pick-up is usually greater than that received from an aerial, and as the weaker the testing voltages are the more severe the test becomes, it is to be expected that any fault common to both circuits would not show up so badly on the gramophone as on radio reception.

We are glad that W. J. A. G. raised this point, because in all comparative tests it is important to notice *any* deviation from the normal in order to get on the track of the trouble quickly. And in this case the original crackling noises, followed by a failure on radio altogether, followed by unusually weak signals on radiogram, showed that the fault was on the low rather than the high-frequency side of the set.

MISSING LINKS, No. 32

BROOKMANS REJECTOR.



This week we have an unusual "missing link"—all the parts are shown, and the test is whether you can fill in the missing "wiring" to join up a Brookmans Rejector.

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

THE COIL UNIT CONNECTIONS.

F. S. (Birmingham).—"My set is the good old 'Magic' Four, and I wish to try a Telsen dual-range coil unit in this, which is marked with Nos. 1, 2, 3, 4, 5, 6, 7, 8. Could you tell me how these points are connected, by numbers, in which case I think I can wire it up O.K.?"

The lead from the aerial goes on to 1 or 2, as required, for selectivity. No. 3 goes to one side of the wave-change switch, No. 4 goes to another side of the wave-change switch.

The remaining side of the three-point wave-change switch goes to earth, to one side of the differential reaction condenser and the terminals 6 and 7 on the coil unit. No. 5 on the coil unit goes to the remaining fixed plates on the differential reaction condenser. No. 8 goes to the tuning and grid condensers.

BACK NUMBERS OF "P.W."

D. L. T. (Buxton).—"Where can I get the back number of 'P.W.' describing the 'Full Range' Two?"

Any back numbers of "P.W." which are still in print can be obtained through a local newsagent; or direct from The Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, London, E.C.4, price 4d. per copy post free.

VARIABLE MU FOR VOLUME CONTROL.

D. N. A. (Nr. Salisbury).—"I have been looking up circuits with the idea of getting a three-valve long-distance loudspeaker arrangement for use with a big outdoor aerial, and I have become very interested in what I read of the variable mu.

"The references I have seen, however, have been very vague, so could you tell me what is the main principle of this type of S.G. valve, and if you have published a set incorporating one of these?"

In current radio practice the word "mu" is understood to mean valve amplification factor, so that a variable mu valve is one in which the amplification can be controlled during operation.

In all but these newest types of valves the amplification factor is quite invariable and depends upon the actual physical construction of the grid, its distance from plate, and the filament, etc. But in the variable mu class of valve a special form of grid enables the amplification factor to be controlled by alterations in the grid bias applied.

When a small grid bias is applied the valve gives the high amplification of low-grid voltages which is expected with the S.G. type of valve; but when a high grid-bias voltage is applied, quite a large input voltage can be dealt with without distortion or overloading, and the effect is as though a much lower amplification valve were being employed for the local station.

As the valves have only just been introduced there are very few circuits employing them, and the best we know of is that in the April issue of "Modern Wireless," in which full constructional details are given for making an S.G. Det. L.F. receiver, called the "Varmu" Three.

THE MODERATOR.

Our recent articles on "Moderating Your Set" aroused enormous interest, and so we are endeavouring to cover as many of the queries as possible arising from it in next week's "P.W." We will not be able to give individual replies in all cases, those selected will be representative ones, likely to be of immediate benefit to the majority of applicants.

In the meantime, here are a few general hints on the subject which will, we trust, solve the problems of many of our querists. It will be appreciated that the fields of application in regard to Moderators are so vast that we could not deal in detail with their every aspect in our articles, though we had hoped that these were pretty comprehensive. For instance, the following points which we enumerate for the benefit of many querists were definitely covered!

1. When the tuning coil is shielded, the metal "can" must be removed or the Moderator coil cannot be coupled.

2. With "Magic" sets, you remove the aerial coil entirely and then place the Moderator coil near the grid coil in the set. For short waves revert to the original connections.

3. "Titan" tuners can advantageously be moderated.

Next week we shall be able to give detailed wiring alterations of some representative arrangements.

"SHORT WAVES"

A Shropshire farmer says that he gets depressed by the Children's Hour on the wireless. Youngsters, of course, can get their own back by deliberately ignoring the Fat Stock Prices.

"Punch."

* * *

A HOWLING SUCCESS.

The Husband: "I wish I could cut out these weird noises."
The Wife: "Why? They're half the entertainment."

"The Sketch."

* * *

Arthur: "Hello, John! Did you listen in to the fight on the wireless last night?"
John: "I should say not! My wife knows too much about fighting already."

* * *

Speaking of broadcasting, the "Radio Times" says: "Here is, in process of development, an education of the best kind: by not abusing its privilege of supplying the public with unprejudiced facts from which to gauge the truth for itself, broadcasting cannot help but build a better informed society."

We wish the people upstairs were a little better informed as to how to regulate their loudspeaker.

* * *

BACK TO SIMPLICITY

I tell the joy of simple things,
The green young grass and the crocus;
The song that the nesting blackbird sings,
The radiant arch that the rainbow flings,
The rosy glow that a March wind brings
And the pattering drops that soak us.

I know of simpler joys than these
(If 'tis simple joys you're after).
There is for instance, the ancient wheeze
Dug up by a star of the B.B.C's;
It's as funny as foot-and-mouth disease,
So the studio rocks with laughter.

"Sunday Pictorial."

VALVE PRICES.

The Electrical Trading Association have issued an attractive folder showing the whole range of Eta valves, with curves and characteristics, at the new reduced prices. Applications for the folder should be addressed to the firm at Aldwych House, London, W.C.2.

"P.W." PANEL, No. 67. SIMPLIFIED WAVE-CHANGING.

Not long ago it was necessary, when changing wave-bands, to change a whole set of plug-in coils.

* * *

A much more convenient method, consisting of a dual-range coil unit, then became popular, the wave-change being effected by a switch on the panel.

* * * *

Later the introduction of the Extenser made a panel switch unnecessary, the rotation of the tuning dial automatically covering both wave-bands.

* * *

The final step in wave-change simplification is the Cosmic circuit, in which three wave-bands—long, medium, and short—are covered without coil changing.

WHERE YOU CAN SEE "COSMICS" AND "S.T. 300."

A further List of Retailers who have Registered as Official "P.W." Exhibitors.

LONDON.
M. Kams & Co., 9, High Street, PUTNEY, S.W.15.
Messrs. Elephant Electrical Co., Radio & Electrical Engineers, 29, New Kent Road., ELEPHANT & CASTLE, S.E.1.
J. H. Brookman, 8, Farley Road, SOUTH NORWOOD, S.E.25.
L. A. Gardiner & Co., 58, Church Lane, S.E.7.
Griffin, 187, Broadway, Uxbridge Road, SOUTHALL.
Harper's Radio, 430, High Street, LEWISHAM, S.E.13.
Northcote Motor Co., 145, Northcote Road, CLAPHAM JUNCTION, S.W.11.
A. Orstin, 154, Green Street, BETHNAL GREEN, E.2.
G. H Pearce, 129, Sydenham Road, S.E.26.
Plaistow Radio Service, 178, Plaistow Road, E.15.
Willesden Radio, 267, High Road, WILLESDEN GREEN, N.W.

ABERDEEN.
The Aberdeen Radio Co., Ltd., 9, Hadden Street.
J. P. Christie, 29, Victoria Road.
Miller Bros., 249–251, George Street.
Smith Sim, 39, Bridge Street.

ARBROATH.
W. McKay, 243, High Street.

ASHFORD.
A. Edenden, 150, Bridge Street, WYE.

AYLESBURY.
C. R. Steggall, 52, Cambridge Street.

BEESTON, NOTTS.
C. Hall & Sons, 68, High Road.

BELFAST.
Belfast Radio & Electric Co., Ltd., 17-19, Queen Street.

BIDEFORD, N. DEVON.
Messrs. F. H. Darch & Son, 13, Chingswell Street.

BIRMINGHAM.
G. F. Collins, 511, Slade Road, ERDINGTON.
J. Elvins, 112, Stoney Lane, SPARKBROOK.
Hopkins Bros., 216, Hawthorne Road, KINGSTANDING.
Lees Radio Stores, 209, Lichfield Road, ASTON.
Malcom & Stewart, 491, Alum Rock Road, ALUM ROCK.
E. Matty, 69, Lichfield Road, ASTON.

BLACKPOOL.
A. Morfitt, 306, Lytham Road.
The Radio Stores, 10, Cedar Street.
J. Taylor (Messrs. R. H. O. Hills, Ltd.).

BOLTON.
J. S. McLeod & Co., 34, Gt. Moor Street.

BRADFORD.
A. Adams, 105, High Street, WIBSEY.
A. Adams, 50, Oak Lane, MANNINGHAM.
A. Ridgway & Co., 23, HALL INGS.
J. Scurrah & Sons, 6–12, Rooley Lane, BANKFOOT.

BROMLEY.
Chapman & Son, 418, Downham Way.

BROMSGROVE.
C. Wynne, 19, Worcester Street.

BURSLEM.
Bancroft Bros., 207, Newcastle Street.

BURY.
Bennett & Co., 36, Union Street.
Manchester District Wireless Co., 21, Agur Street.

CAMPBELTOWN.
A. P. Macgrory, Esq., 16–18, Main Street.

CANTERBURY.
W. A. Goodhew, 22, Sun Street.

COLWYN BAY.
J. Hacking, "Wireless," 7, Erw-wen Road.

COWDENBEATH.
H. S. Stott, 144, High Street.

CROMER.
J. B. Postle, 9, Mount Street.

DARTFORD.
J. C. Freeman & Co., 1, Spital Street.

DERBY.
Hulme & Son, 8–9, Sadler Gate.

DEREHAM.
Utting & Buckingham, Ltd.

DEVONPORT.
Barford Accessories, 66, Tavistock Road.

DUNBLANE, PERTHSHIRE.
A. Connella, Esq., 33, High Street.

DUNDEE.
Swainstons Radio Stores, 66, King Street.

DURHAM.
C. N. Grundy, 27, Station Road, Stanley.

DURSLEY, GLOS.
G. E. Smith, "Elmsleigh," Uley.

EASTLEIGH.
Nalder C. Cox, 16, High Street.

EDINBURGH.
Wm. Borthwick & Co., Ltd., 26, 28, 30, 32, 36, 42, 44, Cockburn Street.

ENNISKILLEN, ULSTER.
W. H. Creighton, 14, Church Street.

EXETER.
G. L. Fildew, Esq., Radio House, 177, Sidwell Street.

EXFORD, TAUNTON.
P. E. Heywood-Bawden, Esq., Motor Works.

FIFE.
W. T. Ross, 16, Millgate, CUPAR.

GAINSBOROUGH.
Shipley & Co., Ltd., Market Place.

GILLINGHAM.
Maningtons, Ltd., 426, Canterbury Street.

GLASGOW.
City Wireless & Cycle Stores, 666, Govan Road.
Gramophone Radio Service, 218, Main Street, CAMBUSLANG.

GLOUCESTER.
Cycle & Wireless Services, 120, Barton Street.

GODALMING.
Jordan's Garage Ltd., 11–13, Ockford Road.

GRAYS.
The Harbon Radio Stores, Southend Road.

GRIMSBY.
Abbey Motors, Freeman Street.

HALIFAX.
C. Ambler, 3, Woolshops, Old Market.

HEMEL HEMPSTEAD.
F. Wilkins & Sons, 54–56, High Street.

HOLT.
Sheldrake & Son, Lion Corner.
A. V. Ship, HOLT.

HUDDERSFIELD.
L. Biltcliffe, 8, Church Street, HONLEY.
P. Dyson & Co., 18, Cross Church Street.
Radio Equipment Co., Market Avenue.
Taylors (Hudd.), Ltd., 6, Shambles Lane.

ILKESTON.
M. Kitchen, 23, Market Street.

IPSWICH.
Boddey Page & Co., 16, St. Margarets Green.

KEIGHLEY.
W. S. Nicholls & Son, 187, South Street.

KIMBERLEY, NOTTS.
J. Goulder, Esq., 10, Norman Street.

KIRKHAM.
P. Croisdale, 19, Poulton Street.

LEEDS.
City Wireless Supplies, 49, New Briggate.
M. Feldman, 58, Meanwood Road.
O. Fox, 84, Commercial Street, ROTHWELL.
G. Lumley, 75, Town Street, FARSLEY.
A. G. Radio Stores, 39, Meadow Road.

LEWES.
E. Goldsmith, 10, The Cliffe.
Leory & Richardson, Ltd., 170, High Street.

LIVERPOOL.
The Beaver Radio Co., 60–62, Whitechapel.
The J. D. Wireless Co., 195, Breck Road.
L. A. Wireless, 304, Stanley Road, BOOTLE.
Stanley's Radio, Ltd., 178–180, London Road.
G. Street & Son, 16, Wavertree Road.

LLANGEFNI.
T. Hughes Davies, High Street.

LONDONDERRY.
Carlisle Radio Store, 48, Carlisle Road.

LONGSIGHT.
S. Abbott, 510, Stockport Road.

LUDLOW.
Messrs. A. W. Packer & Son, 147, Corve Street.

LYTHAM.
F. Calvert, County Garage.

MANCHESTER.
Park Wireless Depot, 37, Raby Street, MOSS SIDE.

MANSFIELD.
J. Jennings & Sons, High Street.

MELTON MOWBRAY.
Sharman & Ladbury, Ltd., Sherrard Street.

METHIL.
Methil Radio Stores, 21, East High Street.

MONMOUTH.
D. C. Osborne, Marine Street, CWM.

MONTROSE, ANGUS.
Valentine & Son, Radio Corner, Murray Street.
M. Wilson, Esq., 138, High Street.

MOTHERWELL.
Glasgow Cycle & Wireless Depot, 113–115, Brandon Street.

NELSON.
F. Delun & Co., 3-5, Prospect Buildings.

NEWCASTLE.
W. Emerson, 255, Westgate Road.
John Mills & Sons, 63, Grainger Street.

NEWPORT.
Newport Electrical Co., 3, Dock Street.

NORTHAMPTON.
V. O. Curtis, Esq., 86, Wellingboro' Road.

NUNEATON.
Collins Radio Depot, 9–11, Riversley Road.

OLDHAM.
F. Fryer, 114, King's Street.
H. Gilbert, 139, Yorkshire Street.

OLNEY, BUCKS.
Minney Bros., 98, High Street.

OSSETT.
A. Wainwright, Wakefield Road, FLUSHDYKE.

OXFORD.
The Oxford Radio Supplies, 29, Queen Street.
G. R. Cooper, 40–44, St. Ebbe's.

PAISLEY.
Clydesdale Supply Co., 9, Moss Street.

PELTON, Co. DURHAM.
H. Sayer, Front Street.

PENRITH.
W. Pears, Great Dockray.

PERTH.
A. Harrower, 150, South Street.

PLYMOUTH.
E. W. Tandy, 5, Belle Vue, North Road.

PORTHCAWL.
Waldron Electrical Manufg. Co., 126, John Street.

PORTSMOUTH.
Southern Wireless Service, 151, London Road, NORTH END.

PULBOROUGH.
L. R. Willmer, Lower Street.

RADCLIFFE.
Turner & Booth, 51, Church Street.
The Talkie Shop, Picturedrome Buildings.

RAMSGATE.
J. Corman, 65, King Street.

READING.
F. Gale & Son, Ltd., 133, Friar Street.

REDHILL.
J. Brems, 35A, Clarendon Road.

REIGATE.
B. Finch & Sons, 35, Bell Street.

RICHMOND.
Morley & Thuey, 14, The Quadrant.

ROCHDALE.
A. K. Cotton & Co., 2, Water Street.

ROMFORD.
Filmays Radio, Filmays Corner, South Street.

A FURTHER LIST OF "P.W." EXHIBITORS WILL APPEAR NEXT WEEK.

THE LISTENER'S NOTEBOOK

(*Continued from page* 156.)

show of the week. And so it might have been with such a galaxy of musical talent in the cast, with such beautiful stuff to sing, if listeners had known what it was all about. Never have I listened to a show in which so many singers failed completely to get their words over. I agreed with the compère (Frederick Lloyd), who confessed not to have followed the course of events. I hadn't, either. Surely the question of enunciation in singing is one singers have got to deal with. An operetta like "The Gypsy Baron," in which there is very little libretto, is ill-suited as a broadcast item, if its songs sound no more than tuneful vocal exercises.

* * *

I shall be sorry if the Commodore Grand Orchestra continue to include items of the "Motor Ride" type in their programmes. I've always liked this orchestra because it could be relied on for something tuneful and spirited, without noise or eccentricity, and always executed in the best workmanship. Frankly, these descriptive pieces, intended for bawling songsters, aren't good enough for the Commodore.

* * *

And this reminds me. Isn't Henry Hall overworking his soloist? And isn't the soloist overdoing his crooning? It's dreadfully irritating to have to listen to an hour of him (for he *seems* to be going all the time).

Personally, I would like to hear the band a little oftener. If we are to have a soloist, why not one who sings *naturally?* He would be unique.

* * *

"To Any Husband" didn't offer anything like enough opportunities to such a brilliant actor as Harold Warrender or, for that matter, to any one of the small cast of promising people. The play was, I thought, a poor affair, and it disappointed me perhaps because I had expected something of the excellence of "Ann and Harold," which was provided earlier in the month. On the other hand, the journey to sunny Italy and back gave the effects department another chance to bring out its marvellous train again.

* * *

That Musical Comedy programme which consisted of excerpts from less popular musical comedies owed its success to the fact that these comedies are not so familiar to that these comedies are not so familiar to the public. It seems that not one of them has found favour with the many operatic societies up and down the country, though they all appear to offer attractive chorus work. Fay Caroll and Brian Gaye dealt very adequately with the several songs, I thought.

* * *

The Victor Olof Sextet, coming on late, seemed to have picked a programme of music more in tune with the hour of their performance than anything else. Their playing was certainly soporific. What happened after Elgar's Elegy I don't know, for I fell asleep.

* * *

I often feel that the B.B.C. might pay more attention to the arrangement of its programmes. All too frequently do we find the best wine left till last, and a very late last at that.

MIRROR OF THE B.B.C.

(Continued from page 156.)

Monday, May 2nd—Programme by the Wisbech Male Voice Choir; play, "Dr. Abernethy"; Percy Pitt conducting the B.B.C. Orchestra (National).

Tuesday, May 3rd—Charles Brewer's musical comedy, "Little Miss Make-Believe"; Chamber Music Concert by the Griller Quartet (National); play, "Dr. Abernethy" (Regional).

Wednesday, May 4th—Symphony Concert conducted by Adrian Boult, relayed from Queen's Hall; Isobel Baillie, Muriel Brunskill, Walter Widdop, Horace Stevens, and the National Chorus (National). "Little Miss Make-Believe" (Regional).

The Yorkshire Mummers.

Thursday, May 5th—"Miscellany," a feature programme arranged by Denis Freeman; Recital for two violins by Jean Pougnet and Winifred Small; the Yorkshire Mummers Concert Party; Joseph Lewis conducting B.B.C. Orchestra (Regional).

Friday, May 6th—Recital by Egon Petri (pianoforte) and Glena Danieli (soprano) (National); play, "Caractacus," produced by Peter Cresswell (Regional).

Saturday, May 7th—Cinema Organ Recital relayed from the Filmophone Studio; Vaudeville entertainment; first talk in the new series entitled "Hazard" (National). Orchestral Concert, including Vaughan Williams' Cantata, by the B.B.C. Orchestra, conducted by Stanford Robinson (Regional).

Sunday, May 8th—Sousa programme by Grenadier Guards Band; Recital by Pouishnoff; St. Martin-in-the-Fields' Service (National); Symphony Concert conducted by Sir Henry Wood (Regional).

A Winning Play.

Monday, May 9th—Operatic programme, conducted by Joseph Lewis; winning play of the British Drama League Festival (National). Concerts by Theatre Orchestra, Wireless Military Band and Chamber Music programme (Regional).

Tuesday, May 10th—Sir Landon Ronald conducting a Light Symphony Concert (National). Vaudeville entertainment (Regional).

Wednesday, May 11th—Recital by Peter Dawson and David Wise (violin); play, "Triumph of Youth" (National) Percy Pitt conducting Orchestral Concert (Regional).

Thursday, May 12th—Chamber Music Concert; "Freak Programme."

Friday, May 13th—Songs from the Shows (National). Pini Tango Orchestra; Sir Henry Wood conducting Concert of Contemporary Music, preceded by a talk on the concert (Regional).

TECHNICAL NOTES

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

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

Interchanging Valves.

THERE is often a good deal of misunderstanding about amplification factors of valves, and many amateurs think that all you have to do is to pull out a valve and put in another with a higher magnification factor and you will be bound to get greater signal strength. Now this is not at all necessarily true, and you may find that the signal strength is not changed or you may even find that it has become less!

The point is that you have to consider not only the magnification factor of the valve, but also its *impedance*. It is fairly safe to say that if you have two valves with different magnification factors, but with the *same* impedance, then substituting the one with the higher magnification factor for the other one will result in an increase of strength of distant stations since the overall amplification will be greater with the better valve.

Look out for Instability.

It is not even quite so simple as this, however, because if the overall amplification is pushed up too much you may get instability, and any advantages will be counteracted. For instance, suppose the valves in question are S.G. valves, it is quite possible that if the set is working satisfactorily and you substitute another S.G. valve with a higher amplification factor, the whole receiver may become unstable.

What I have said applies more particularly to high-frequency amplifying valves. The position with the H.F. valves is not quite so simple as with the L.F. valves, since with the H.F.'s we have also characteristics of coils to consider as well as certain other factors.

In addition to this, there is always the question of shielding to be considered, and in general we are not dealing with simple magnification. So that you want to exercise a good deal more care with regard to the replacement of high-frequency amplifiers, particularly of the S.G. type.

So far as low-frequency amplifiers are concerned, it is much simpler to say beforehand what the result will be if you substitute a valve of certain known characteristics for another one.

Spaghetti Resistances.

How long is it since we have been using spaghetti resistances? At any rate, however long it is, they seem to be increasing in popularity and have certainly established themselves as a permanent and very useful little component.

It was quite a good idea on somebody's part to think of making wire-wound resistances in flexible and handy form, and the spaghetti resistance is often very useful in cases where it would be inconvenient if not impossible to fit in a wire-wound resistance of the ordinary type.

There are several points to bear in mind, however. The different resistances have definite current-carrying capacities or ratings, and you should be careful to make a note of these so as not to over-run a resistance.

Beware of Bad Contacts.

Another practical point is that the metal end-pieces sometimes come loose, or are not properly fastened on in the first place, and you may get a bad contact which will cause clicks and other irritating noises in the loudspeaker. As a rule, this can be got over by the very careful use of a pair of pliers in pinching the end into position so as to get a good firm grip of the resistance element.

Detector Improvements.

A condenser added to the anode circuit of a detector often effects a decided improvement. It may bring about an increase in volume or, on the other hand, it may have the effect of making the reaction circuit easier and more satisfactory to operate.

In any case, it is very easily tried, especially if you happen to have a couple of spare fixed condensers. The condenser should be connected between the anode of the detector valve and the filament and different values should be tried until you see which gives you the best results.

This little dodge does not apply to all sets, but in cases where it does apply it sometimes brings appreciably improved results and has the advantage of being very easy to try.

About Valve Pins.

It is curious to note how design has changed during the past few years in regard to the small but very important matter of valve pins. First of all, we had the rather crude and clumsy split-pin of the ordinary kind, and this was later followed by the much better "banana" type, in which the loose leaves extended backwards from the tip.

The banana type of pin has, in my opinion, a good deal to recommend it for a nice, soft, smooth fit, but it is not quite so easy to make and the leaves are apt to get broken off.

The foregoing types, together with the later side-slotted pin, all rely upon the springiness of the pin itself to get a firm electrical contact, the valve holder being rigid.

Types of Holder

With the latest type of "solid hollow" pin (or, more correctly, a rigid tube) there is a very small amount of "give" and this is preferably provided by springy members in the valve holder. A very good example of such a valve holder is the Telsen holder, which has metal spring contacts at the sides of the sockets so that, even if there were no "spring" at all in the valve pins, firm electrical contact would still be made.

These holders are designed to provide an efficient contact with the valve legs, whether split or non-split. They have a further advantage that they are of low capacity and are self-locating.

When using a valve with solid pins and in an ordinary rigid valve holder, if there is any "out-of-truth," about the only thing you can do is to bend the pins, but this should be done very slowly and with great care, otherwise you will overdo it or actually crack the material of the valve base.

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

nductor Speakers.

Judging from inquiries received, a great nany readers seem to be interested in the nductor, or so-called inductor-dynamic ype of speaker. This is, in a sense, not xactly a cross between an ordinary reed-riven speaker and a moving-coil, but omewhere between the two, and probably his accounts for its popularity, together ith the fact that a permanent magnet eld is used, so that no field-exciting urrent is required as with an ordinary oving-coil speaker.

One of the great advantages of the oving-coil is that it is capable of movement hrough very large amplitudes, and this is articularly important in the lower fre-uencies where, as you know, a corre-pondingly larger amplitude is necessary n order to give the same aural impression f loudness. At very low frequencies some f the moving-coils will actually vibrate hrough a distance of about one-tenth of an nch, which is quite out of the question ith an ordinary reed-driven type of peaker.

reater Freedom of Motion.

The inductor speaker is a comparative ewcomer to radio, and employs a moving-ron system, but with much more freedom f motion than that of the reed-driven type. Of course, you must bear in mind that he permissible amplitude is nothing like o great as that of the moving-coil speaker.

With an inductor speaker it is a good lan to introduce a transformer or choke, o as to isolate the speaker from the set. Perhaps I should have said that this is a ood plan with *all* speakers, and that the nductor is no exception to the rule.

With many speakers, of course, you have o use a transformer for matching up nductances, altogether apart from the uestion of isolating the speaker from the node current of the set. For instance, ith a moving-coil speaker, generally you ave to use a very high step-down ratio n view of the very low inductance of the oving coil itself.

nductor Quality.

I have experimented a good deal with he inductor type of speaker, and as egards quality I do not consider that t is quite in the same class as the moving-coil: but, nevertheless, it is quite an mprovement upon older types, and seems o me to fill a need, particularly in view of he fact that it can be worked direct from he set without any field current.

The amplitude of movement of the one obtainable with an inductor speaker s sufficient to warrant, if not indeed to equire, the use of a baffle board, just as with a moving-coil. If you are using an ordinary reed-driven speaker, and you have leanings in the direction of a moving-coil, but do not want to go to the trouble of providing a separate field current, it may well be worth while to consider an inductor speaker. The best types give excellent results for all-round purposes, and are undoubtedly a very good proposition.

Aerial Condenser Effects.

I said something about the use of a pre-set condenser in the aerial some little

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

time back, and several readers have raised various points with regard to this, particularly on the question of the wave-length range.

Everybody knows that introducing a small condenser in series with the aerial generally has the effect of sharpening up the selectivity, although, at the same time, it may reduce the signal strength below normal. This is more particularly the case if the capacity of the condenser is too small.

On putting in a condenser, in fact you may sometimes find that the signal strength is actually improved at first, but as the capacity of the condenser is still further reduced, the signal strength will fall off. Not only is the selectivity actually improved by the use of a series condenser in this way, but if the signal strength is reduced there is a still further apparent sharpening of the selectivity, due to this very reduction of the signal strength fed into the first valve.

Effect on Tuning Range.

Now as regards the tuning range, so long as the capacity of the condenser is kept within proper limits, the tuning can generally be brought down to include lower wave-lengths without really sacrificing anything appreciable at the upper end.

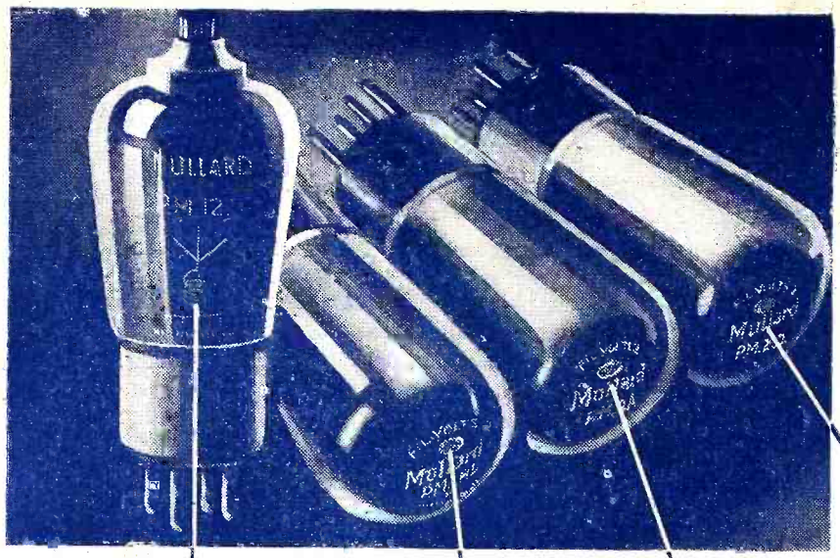
The reason for the increase in selectivity is that the condenser in series with the aerial has the effect of reducing the aerial damping; and, of course, with reduced damping, selectivity is naturally sharpened.

You need not use a pre-set condenser: you can use a *fixed* condenser if you wish, but inasmuch as the best value of capacity depends so much upon circumstances, so that it is impossible to say beforehand precisely what value will be the best, it is preferable to use a pre-set condenser, so that you can adjust this in accordance with your own particular conditions. I should, perhaps, mention that a maximum capacity of about ·0003 mfd. will generally be found to meet the case.

The Earth Question.

Probably you may have noticed recently that various water-supply companies have been inquiring into the question as to whether they should allow water-pipes to be used as earths for radio sets. The trouble appears to be that in some cases the minute currents running to earth cause disintegration or corrosion of the metal pipes owing to electrolytic action. Incidentally, water-pipes have been used as earth connections for ordinary house telephone installations long before broadcasting began.

The problem is rather an interesting one, and we shall see in due course what attitude the authorities take up.



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S.S

POPULAR WIRELESS, April 23rd, 1932.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

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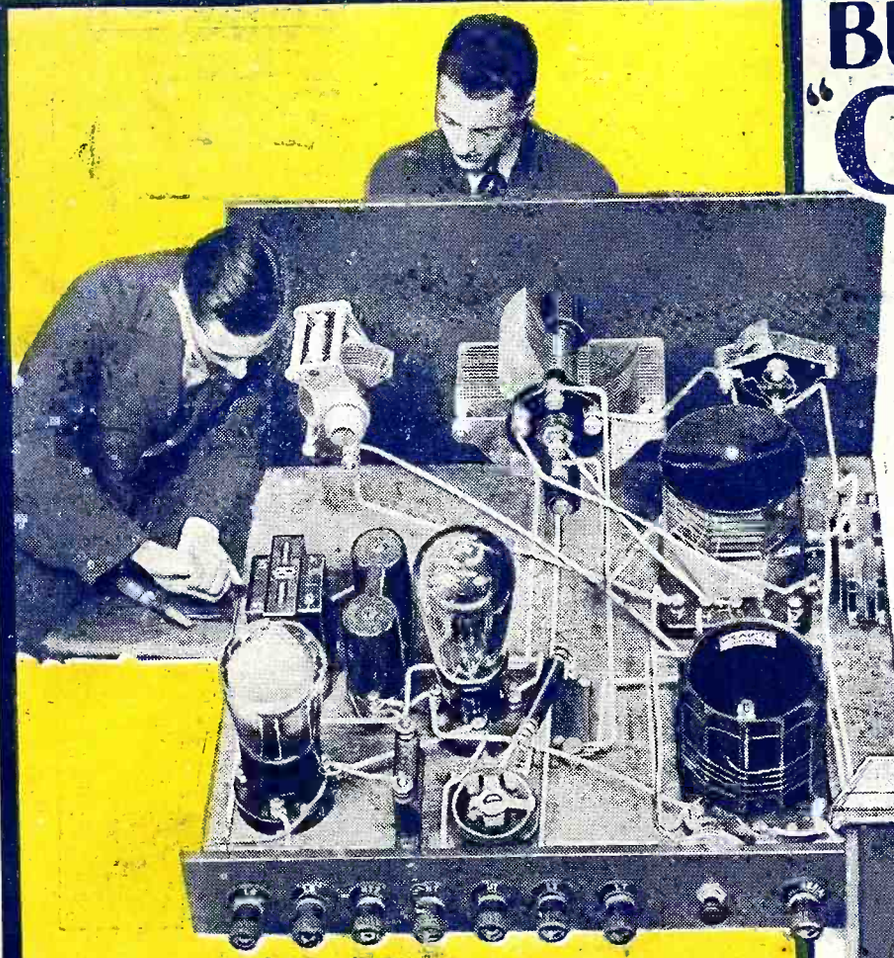
No. 516. Vol. XXI. April 23rd, 1932.



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SHORT-WAVE NEWS
HOTEL RADIO
OLD AERIAL REVIVED
NEW TYPE VALVE

THE NEW DANCE BAND
HISTORY OF A CLUB
MORSE, R.A.
WIRING UP

RADIO NOTES & NEWS

The Colour's the Thing.

SO far as I have heard up to the present, the outstanding feature of this year's Radio Exhibition at Olympia—apart from the fact that the exhibition is to be held in the middle of the summer holidays—is its colour scheme of royal blue and silver. This scheme replaces that, which for the last eight years has been royal blue and gold: so you can see that no mental effort to make the show a success has been spared. However, to drop this chaffing, I may say that the main design of the Grand Hall layout, as conceived by the R.M.A., is a striking and attractive variation of former arrangements.

Air Ministry's Appeal.

THIS is nothing to do with radio, but is in the public interest. The Air Ministry appeals to the public not to disturb more than may be necessary the remains of damaged aircraft. Further, if pieces of the aircraft are found at a distance from the scene of the crash, the fact should be reported at once to the police. Interference with wreckage is illegal and, in any instance, the smallest part of a wrecked plane might be essential to the discovery of the cause of the accident.

Short-wave News.

IN a paper read last month by Mr. T. L. Eckersley, B.A., B.Sc., before the Institution of Electrical Engineers, it was disclosed that deductions from the behaviour of short waves over long distances, when used in the Marconi facsimile method of transmitting pictures by radio, showed that waves of 15 to 50 metres normally pierce the Kennelly-Heaviside Layer at a height of 100 kilometres, and are reflected by the Appleton Layer, which is electrically denser, at a height of 300 kilometres. By the way, it was stated also, that as the maximum density of the Appleton Layer is half as great again now as it was in 1928, the ultra-violet light from the sun is less intense now. What sun? Where?

Wonderful Hotel Radio Supply.

THE new Waldorf-Astoria Hotel in New York is equipped for the delivery of six different programmes to each of its 1940 private rooms and many of its public rooms. Some of these programmes may be radio broadcasts picked up by the hotel's aerials, and others may be tuned-in from various public rooms in which interesting events are happening or bands playing. In addition, the hotel has a permanent sound picture system for the grand ballroom, and a portable one for use in the smaller public rooms.

New Zealand Changes Over.

THE Radio Broadcasting Company, New Zealand, has been awarded by an arbitrator the sum of £58,646 in respect of its four stations which have been taken over by the New Zealand Government. The Company's licence expired at the end of last year, and in future broadcasting in New Zealand will be controlled by an independent Board constituted on the lines of the B.B.C. I think that Canada will be the next to come into line.

Old Type of Aerial Revived.

J. F. writes from Manitoba to tell us about a type of aerial which is popular in those parts; this turns out to be our old friend of the "umbrella" type. One pole, on the roof, with an insulator at its free end, from which three legs of wire go to insulators on other parts of the roof, like the ribs and stick of a partly opened gamp. This is a useful type, but its novelty has lost its youthful appearance. Incidentally, J.F. says that the usual kind of aerial, which consists of a single wire strung horizontally, is not so good because of its "directional" effect: but I understand that this effect is so small as to be negligible, unless the length of the horizontal portion is great compared with that of the down lead.

New Type of Valve.

THERE seems to be no end to the possibilities of vacuum tubes. At a recent meeting of the American Physical Society representatives of the General Electric Company of New York announced the invention of a valve said to be 1,000 times more sensitive than its predecessors in the measurement of minute voltages. This valve, with an exhaustion of one billionth of atmospheric pressure can detect voltages of one ten-millionth of one volt—which is a voltage of the order of magnitude of that which is produced by a heart beat, for the detection and recording of which a portable electro-cardiograph can now be supplied.

(*Continued on next page.*)

RADIO IN THE GERMAN PRESIDENTIAL ELECTION

Radio's importance in politics seems continually to increase, and it certainly played a large part in the election of the President of the German Republic. Here is one of Berlin's giant public-address vans which urged the people to vote for Hindenburg.

NEWS—VIEWS—AND INTERVIEWS (Continued)

Bell, the Wizard of Sound.

ANOTHER "American" inventor, Alexander Graham Bell, who was born in Scotland and educated there and in London, spoke some ten or eleven years ago by radio-telephony from London to the League of Nations at Geneva. I had the honour to be a sort of M.C. on that occasion.

Bell asked me to write out a suitable speech for him, which I did, by dint of intensive brain-work, there and then. He took it, thanked me effusively, and then shoved my masterpiece into his trousers pocket and gave a speech "off his own bat."

I recollect that he refused coffee and cigars, though the ground was snow-covered and the hour early—Christmas or Boxing Day, I believe.

Henry Hall and the New Dance Band.

I MEAN orchestra, of course! Well, I think that Henry will weather the storm and ride on an even keel (row). I do not think, though, that ladies will send him flowers, birthday cards, etc., for his vocal microphone appeal is not so winning as that of the breathless Jack Payne. It's the human touch that "gets over," Henry. As to the orchestra, whilst it seems to me to be lighter and less decisive in voice than the dear departed, I think that it has a distinct personality which will gradually please the public. It lacks the volume of J. P. & Co., but certainly has a "sweetness and light" touch which a dance orchestra should possess. I wish, however, that Henry would do without a vocalist; the B.B.C. already has too many!

Insult Added to Injury.

I HEARD, not long ago, of a fellow who smoked hard for two years, adding coupon to coupon, and at last exchanged the coupons for a radio set. It was not a very good set and seemed to have been made by a draper. It was distinguished by a dignified silence. Now, while its owner was in the course of trying to make it function, he was "pinched" for not having a licence. If you know of a harder bit of luck than that, let's hear about it!

Interval for Refreshments.

IT is pleasant to pick up a letter from Plymouth, writ by one, F. W. Last year I paid a flying visit to the Hoe, via the prison—and it "thundered and lightninged" so much that I fled to tea and toast down a side street. I propose to tramp Dartmoor this year, in revenge.

F. W. makes W. L. S. and myself blush with his kind remarks, and the Editorial fellers positively propose to form a Union to demand (on the strength of his praises), more tea per pot per person.

My dear F. W., letters like yours reconcile us to our fate to work in Tallis Street while less worthy men breathe the placid air of Dartmoor—and get their porridge free!

Brief History of a Club.

THE formation of a short-wave club for Coventry and District, which I announced at Christmas time, excited a very gratifying amount of interest, and about twenty people attended the first meeting, one even cycling ten miles to be present. (No Laodicean, he!) Everything seemed to be going as merrily as an electron in a "space charge" when difficulty arose in regard to a club-room; meanwhile, the winter was passing, or so the almanac said, and the waiting members began to diminish in number. So now it looks as though the attempt must be written off as a mis-fire, and the project postponed till next winter. Well, call on "P.W." again when you are ready, boys.

"SHORT WAVES"

HEAR, HEAR.?

By a new microphone, the closing of an eyelid can be made audible.

Forte winks.—"Sunday Pictorial."

* * *

It is stated that the B.B.C. has a new saxophonist standing 6 feet 7 inches, and weighing over 17 stones.

We are not intimidated.—"Punch."

* * *

Owners of valve receivers often deplore the life of the batteries. They should always purchase them as far away from where they live as possible. This will ensure them "going a long way."

* * *

Johnny (proudly): "You know, Granny, Marconi invented the wireless."

Granny: "Oh, Johnny dear; you know you ought to say Mrs. Coni."

* * *

"Soon they will be trying to form a 'to bed' committee in an effort to make the public go to bed at a set hour every night."—A Brighton Vicar.

That will at least be a change. At present we can't go to bed because of the wireless set next door.—"Pictorial Weekly."

* * *

DISILLUSION!

What's on? Talk on "Hygiene"? How bright!
Then an "Orchestral Concert" (termed "light"),
And a "French Talk" to swallow,
"Shipping Forecast" will follow—
Oh! Good-night, everybody! GOOD-night!

Television Note.

THE Editor of the *Scientific American*, a magazine of high repute all over the world, says in its April issue: "... it must be remembered that television is as yet a new art, and that it involves factors on which there has never been accumulated sufficient knowledge to make rapid progress possible. Television is here and has been here for some time—but only in the laboratory stage." I am sorry to see it reported that the Federal Radio Commission has refused a licence to an American station which wished to use the Baird television system, though this, I should add, is not an adverse reflection on that system, but the result of a fear that the licence would in some way give a foreign firm too big a standing.

Morse, R.A.

DID you know that Professor Samuel F. B. Morse, inventor of the telegraph code which bears his name, was trained for and intended to be an artist, a painter and sculptor? He came here to study art in 1811, and actually gained a gold medal in 1813 for a statue. Then he thought of *dah-de-dah* and no more was heard of his art.

On February 11th, however, an exhibition of his paintings was unveiled at the Metropolitan Museum of Art, New York City. Maltreating the classic slogan, I may say, "Art is long but telegraphy is quicker!"

The Performing Milliammeter.

THE technical squad have passed me a letter from J. A. (Birmingham). This comrade acquired a milliammeter—price not stated—and experimented, with various (alleged) known resistances, on his H.T. battery. His table of readings are fit to make Mr. Ohm turn in his narrow cell.

I sorrow with him. In China, years ago, I had a voltmeter which registered a consistent 2·3 volts on all fully-charged accumulators on weekdays, but which said 1·7 on Sundays. Moreover, when it said that a charged accumulator, *on charge*, registered 3·6 volts I knew we should have a typhoon in 24 hours! The moral, is, accurate standards and measuring instruments are darned expensive.

Wiring Tip.

A USEFUL hint, but one which I hope you will never take, comes from America, where an electrician overcame a cable-laying trouble in a novel way. He required to pass the cable across a house, between the roof and ceiling, but the available space was too small for him to take it through himself. So he procured a cat and tied a long piece of string to its tail. (Even *that* wants doing! You just try it!)

He then inserted the cat into the hole, which he blocked up sufficiently to prevent the animal from "backing out" of the job. All he had to do after that was to wait at the opposite hole till the cat emerged, when he untied the string and fastened his cable to it, so that he could pull it through from the other side. What a brain!

ARIEL.

THESE RADIO COMPONENTS

A COMPLETE AND CRITICAL REVIEW

I BEGIN my first article on components, by dealing with tuners and coils.

The basic requirements of a good tuner and/or high-frequency circuit is that the circuits shall respond relatively very strongly over a band of frequencies of width about 8,000 cycles and relatively very weakly to *all* other frequencies. But the band-width of response must be variable, otherwise stations will come in together, particularly when one, contiguous to another in the wave-length plan, is comparable in strength to the one one wants to select. Thanks to the inaction of the Union Internationale de Radiodiffusion and to the high power of stations, what we call selectivity is a paramount consideration.

The Ideal Solution.

Now, the ideal arrangement of circuit is to use, say, twenty coils, each in cascade and each coupled to the other. But the ideal solution is impractical. The Americans, with their cheaper valves and mass production, come nearer to the ideal design than anyone. But the British manufacturer is penalised.

In practice, and where, as in Britain, the price of valves is relatively high, we have to use only a few stages of high-frequency tuned circuits, and the design of the coil becomes very important. It must have, however, whether connected as band-pass. or peak-tune, a low value of resistance for a given value of inductance. So we come to coil design.

From what has been said above we see that we judge a coil for a practical set in terms of the lowness of the ratio of its resistance to inductance or, more scientifically, its R over L ratio.

But coils frequently have to be screened or they couple to one another and produce unwanted and uncontrollable retroactive effects.

The Eckersley Tuner.

If coils did not have to be screened or, more clearly, in designs where coils need not be screened, the R over L ratio is largely determined by the actual physical size of the coils.

In the Eckersley Tuner the coils were purposely made big. They had a lower R over L ratio than any coils ever put on the component market. The Eckersley Tuner

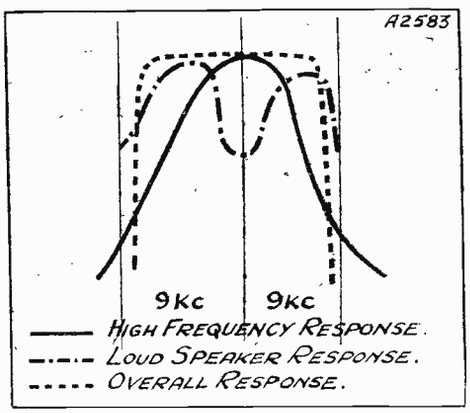
1. COILS AND TUNERS.

This week our Radio Consultant-in-Chief really gets to work in his analysis and criticism of modern radio components. Logically he starts with coils, for these are found at the "front doors" of all sets. In later articles he will deal with the various other sections of a set, and the parts used in them.

is, in consequence, far more selective than any other similar device. It appears as if this component has not been properly understood. It was designed for an inexpensive *set*.

That the unit was in itself more expensive than other units is true, but other units have to be used with high-frequency

"A PERFECT COMBINATION"



Capt. Eckersley suggests that the peak tuning given by ordinary coil and condenser arrangements is "the thing for modern needs," as it tends to "correct" the response of the average modern loudspeaker or, if you prefer it, vice-versa. You see by the "dash dot" curve that a loudspeaker deals less efficiently with the low notes and that these represent just that part of the "audio" range of frequencies which "peak tuning" emphasises.

valves *and* they are not so selective *and* the price of the whole set, using such other coil units, is frequently greater than the Eckersley set.

One point more while I am still on the Eckersley Tuner. My correspondence shows that the sole criticism of the device was that it was insensitive. All detector and two-note mag. sets are insensitive, and depend wholly for their sensitivity upon the use of big aerials. If you can get a big aerial I will guarantee you more *separate* foreign stations than any other set at the same price.

Screened Inductances.

When coils are screened they have to be smaller and the criterion of size no longer exists. The R term—the resistance of a coil, in fact—is influenced by screening. A big coil spreads out its field, and this sets up wasteful eddy currents in local screening boxes or canisters. Small screened coils, therefore, can be quite efficient.

Some manufacturers publish curves of the so-called dynamic impedance of their coils when tuned by a suitable condenser. I should feel happy when purchasing a coil the performance of which is published. You should get dynamic impedances (provided no retroaction is employed) of about 100,000 ohms at the shorter, down to 10,000 at the longer medium waves. Any coil giving this kind of performance is to be recommended.

Coil Construction.

It is terribly important to look into mechanical construction, particularly if you are to use ganged condenser tuning. If wire stretches or the former warps the inductance must change, and this will throw out all the tuning and make selectivity a farce. I have seen coils which would not last a few weeks, others are carefully held together, and should stay put for ever. Shoddy ebonite—muckite, in true fact, will soon warp. Paxolin is good stuff, so is good-grade ebonite.

Band-Pass Units.

Thus, if a coil is not shielded its efficiency increases with its size, its permanence with material used and care in construction.

Some of these band-pass units are a snare and a delusion. A reliable friend told me he had measured up one or two and found not only the primary intended response, but one fifty kilocycles away from that response as well!

To my mind "band-pass" is a much-abused term. It usually means an asym-

(*Continued on next page.*)

OUR LISBON PROGRAMME

Some extracts from the thousands of postcards and letters received from readers. The original "Cosmic" Record was carefully preserved for the writer of what we considered to be the best commentary on the historic broadcast, and details of the award are given below.

" . . . The reception was at times brilliantly clear, and I think POPULAR WIRELESS will receive the sincere thanks of numerous short-wave fans. Is it not possible to arrange other 'P.W.' broadcasts . . . ?"—G. B. C. (Normanton, Yorkshire).

" . . . 'P.W.' scores again! CT1AA provided excellent 'meat.' . . . Subject original. Whole programme enjoyed. More, please . . . !"—T. A. W. (Roundhay, Leeds).

That Personal Touch.

" . . . I felt that the broadcast provided the hitherto impossible personal contact between Editor and reader. Although providing excellent entertainment, it was of scientific and international importance . . . "—E. A. C. (Pear Tree, Derby).

" . . . Fine, isn't it, the way POPULAR WIRELESS looks after its readers? . . . Makes us feel like one of a big family . . . !"—W. T. (Trafford Park, Manchester).

" . . . It was the best that could have been crowded into any two hours . . . "—I. M. (Glasgow, C.3).

" . . . I think that you and Captain Eckersley should have visits to some more Continental stations. . . . Many thanks for the excellent broadcast. I had previously thought my set to be a dud round 42·9 metres . . . "—J. B. M. (Killock Drive, Glasgow).

" . . . 'P.W.' was right again. I've read it since 1926, and it's always right. . . . Thanks, 'P.W.' . . . "—B. W. M. (Hythe, Kent).

" . . . What a thrill to hear C T 1 A A giving a special transmission for all 'P.W.' readers! . . . Who would not be a reader of such excellent radio papers when they provide the most up-to-date ideas for their readers, a world-wide set, and a special world-wide transmission to try it out on . . . . ?"—G. G. (Birkenhead).

" . . . I write to thank all concerned in the enjoyable broadcast from Lisbon . . . "—W. J. L. (Ouslebury, near Winchester).

"A Splendid Plan."

" . . . I thought the broadcast such a splendid plan. Congrats., 'P.W.' from a woman . . . !"—Miss M. L. M. (Penrith, Cumberland).

" . . . The two hours' broadcast from Lisbon was the best I have ever spent among the short waves, and may we have a few more like that one . . . "—C. N. (Stourbridge, Worcester).

" . . . I wish to write congratulating you on the decision to give an address in Esperanto near the beginning. How much simpler foreign listening will become when the use of Esperanto by the announcers is more widespread . . . !"—A. G. B. (Ashford, Kent).

" . . . Thanks are due to 'P.W.' . . . it gave us an opportunity of hearing Captain Eckersley on the air again . . . the latter might well have been in the studio in person instead of on a gramophone record . . . "—G. C. A. (South Bermondsey).

" . . . May I congratulate you on your special programme from Lisbon? Last night reception was very good, excellent loudspeaker strength being obtained. The talks by Mr. Kelsey, Captain Eckersley, and Dr. Penha Garcia were splendid, every word being distinct. . . . Best wishes to 'P.W.' . . . "—C. J. B. (Plymouth, Devon).

" . . . Good luck and thanks for your pioneer work . . . "—G. S. (Southampton).

"Big Ben and the Soap Box."

" . . . Hearty congratulations on your excellent broadcast. P. P. E.'s speech was great, especially his amusing remarks about Big Ben and the soap box. 'P.W.'s' idea of a special programme will do quite a lot to popularise short-wave reception, especially if the dose is repeated at short intervals . . . "—J. W. H. (Gloucester).

" . . . Congrats., 'P.W.!' Real live-wire radio! Your broadcast received here perfectly. . . . 'Cosmic' is my next set . . . !"—W. A. A. (Anfield, Liverpool).

A BEAUTIFUL BROADCASTER

Lady Wilkins, wife of the famous broadcaster, who was well-known on the stage as Suzanne Bennett, broadcasting from a New York station.

" . . . This Lisbon idea is the absolute limit, surely even 'P.W.' cannot find a better and brighter one. During its career it has 'popped' up with some marvellous things, but to bring the wonderful 'Cosmic' into being and then confidently provide us with a special programme umpteen miles away! Who said the sky's the limit . . . . ?"—T. O. S. (Bolton, Lancs).

"On taking up S.W. reception in 1923 I was greatly impressed by the spirit of comradeship existing between amateur transmitters of various countries. I thought then as now—'If Peace Conference delegates were selected from S.W. amateurs, World Peace would be assured.' Lisbon's 'P.W.' 'Cosmic Overture Seals More International Comradeships.'"

Yours faithfully,
H. RIDDLE.

North Street, Wilton, Wilts.

And, after careful consideration, we have decided to award the prize to Mr. Riddle, not so much on account of his clever play on the letters of the word "Cosmic" as for the sentiment he so aptly expresses in his entry. The original "Cosmic" record will be sent to Mr. Riddle in due course, and we feel sure readers will join with us in congratulating him.

THESE RADIO COMPONENTS

(Continued from previous page.)

metric response, too wide for modern conditions, and requiring an accuracy and skill in adjustment outside the powers of most people who operate the set.

The theoretical value of band-pass is that you get more upper frequencies and a flatter response.

Few people realise that the loudspeaker response is such as to compensate for the theoretical bad qualities of peak tuning. Look at my diagram. Here is a peaky response high-frequency curve against a typical loudspeaker response. The combination is perfect!

Peak Tuning Better.

Again, the peak tuning device, particularly where reaction is used, has the profound merit of increasing the intensitivity of the local or wanted carrier. This, in turn, gives a much better detector efficiency and, in creating strong demodulation effects, gives an enhanced selectivity provided the low-frequency response cuts off quickly above 6,000 or so. And in modern conditions this must be done.

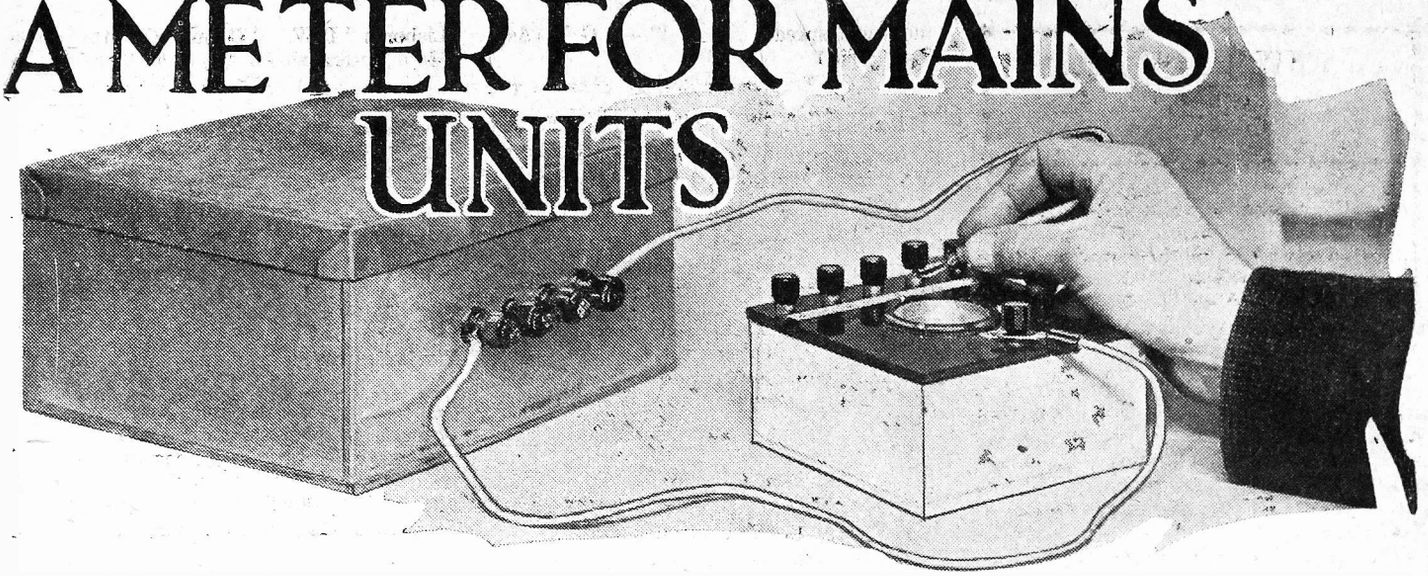
The band-pass so called may even reduce carrier-wave strength and give too little bass to a loudspeaker already deficient in that quality. No, peak tuning is the thing for modern needs, and I repeat, if you want a cheap set and if you can use a decent-sized aerial, the Eckersley Tuner is the best of all coil units. I say it unashamedly because from calculation and personal tests I know it to be the thing.

Plug-in Coils.

I know plug-in coils are a nuisance, but they have very useful qualities. They have a low R over L ratio for one thing. For another you can get right down and up in the waveband very efficiently. The sole difficulty and the reason why they have been abandoned is because they will not gang. But if you are using a two-circuit arrangement, with a detector and two-note mag. afterwards, the plug-in coil still has great merits. By using a coupled circuit you can even get a variable band-pass, but you have to get to know your set.

In sum, coil units must be well made and have a high efficiency. For high-frequency mag. they must be screened, when they can be moderately small. When unscreened, size means efficiency. Peak tuning is good in spite of theoretical disadvantage. Peak tuning is necessary with the simpler and cheaper sets. The best peak tuner—well, I've said that already!

A METER FOR MAINS UNITS



An extremely useful instrument that will enable you to check the voltage output of your mains unit. It puts practically no load on the unit, taking only two milliamperes for a full scale deflection. It has four voltage ranges, and will also measure currents up to two milliamps.

IN the early days of broadcasting the only duty which an H.T. voltmeter was called upon to perform was to measure the voltage of ordinary H.T. dry batteries. If it took rather a lot of current it did not much matter as, after all, it was used only for a few seconds at a time.

This pleased the manufacturers tremendously, for it was infinitely cheaper, and easier, to turn out low-resistance meters which had good healthy appetites, than the highly sensitive instruments that consumed only a milliampere or so for a full-scale deflection.

Misleading Reading.

The result was that the British market became flooded with cheap, inefficient voltmeters, some of which required as much as 25 milliamperes to push the needle over to the 100-volt mark. Now with dry batteries and H.T. accumulators this did not worry us a great deal, provided the meters were not used for too long.

When mains units came along we were really up against it. A particular unit was probably designed to give about 120 volts at, say, 15 milliamperes. Without thinking, we probably put the voltmeter across the output terminals, and were no doubt horrified to find that it gave a reading somewhere in the neighbourhood of 50 volts.

"What Now?"

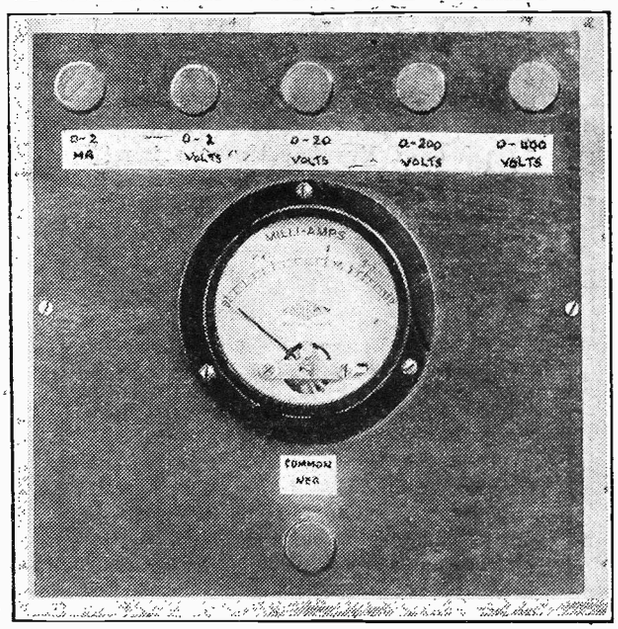
"Whatever has happened now?" we probably thought. Well, the mains unit simply had not sufficient power to push the needle over. Obviously we could not get 25 milliamperes out of a unit that was designed to give only 15 milliamperes or so. A dry battery or accumulator has a fairly low internal resistance, and is capable of giving fairly heavy current for short periods. On the other hand, a mains unit is just the opposite and has quite a high resistance, due mainly to the smoothing chokes, and voltage-reducing resistances.

The result is that the unit will give only a limited current at anything approaching the normal voltage. As soon as we try to draw more from it, the internal resistance comes into play, and the volts just fade away. What we really require is an instrument that takes very little current, something in the neighbourhood of 1 milliampere for a full-scale deflection.

A Quick Conversion.

Such meters have to be extremely sensitive and, needless to say, are very expensive; but if you happen to have a milliammeter by you with a range of, say, 0–2 milliamperes or perhaps 0–5 milliamperes, you can very quickly convert it into an extremely sensitive and efficient H.T. (and L.T. for that matter) voltmeter.

IT MEASURES VOLTS AND MILLIAMPS



This photograph of the finished meter needs little explanation. The lower terminal marked "Common Neg." is common to all the ranges, the positive lead being joined to one of the terminals at the top.

Most of you probably know Ohm's Law, which tells us that the current flowing in a circuit is equal to the applied voltage divided by the resistance. Or twisted round a little, that the resistance in a circuit can be found by dividing the current into the voltage.

A Multi-Ranger.

Well, now we will assume that we have a 0–2 milliammeter, and we want to turn it into a voltmeter, and make it read from 0–200 volts. That is, each milliampere division will represent 100 volts. By making use of Ohm's Law we can easily see that we require a resistance in series with the milliammeter of such a value that it will pass 2 milliamperes at a pressure of 200 volts.

Therefore:

Resistance = 200 volts ÷ ·002 amps.
(2 milliamps) = 100,000 ohms.

So, if we take a 0–2 milliammeter and connect a 100,000-ohm resistance in series with it, the instrument then becomes a voltmeter, reading in hundreds of volts. A 0–1 milliammeter will read from 0–100 volts, and a 0–5 milliammeter from 0–500 volts, and so on.

What is more important, it will consume only 1 milliampere for each 100 volts. How much more satisfactory than our low-resistance meter eating up its 25 milliamperes. Now I am going to tell you how to make a very useful instrument on these lines. Not one just reading over a single voltage range, though, but a multi-range affair which has many uses.

Some Examples.

I knocked one up myself a week or two ago, and besides reading from 0–2 milliamperes (its normal range) it reads from 0–2 volts, 0–20 volts, 0–200 volts and 0–400 volts. The different ranges are obtained by separate series resistances of the correct value.

If you look at the accompanying diagram and photographs, you will see that it has a row of terminals along the top to which the different resistances are connected. All the values are calculated from the formula mentioned previously.

(*Continued on next page.*)

A METER FOR MAINS UNITS

(*Continued from previous page.*)

e.g. Resistance = voltage ÷ current in amperes.

Just to give one more example, let us take the 0–2-volt range. Well, the required resistance equals 2 volts divided by ·002 amperes (2 milliamperes) which works out to 1,000 ohms.

Small Percentage of Error.

I will not say that this instrument is dead accurate, but it is quite good enough for ordinary use. The error, if any, depends largely on the accuracy of the series resistances, which can be purchased at random, and even then not be more than 10 per cent out. There are some makers, however, who guarantee all their resistances to within .5 per cent, which, after all, is not at all bad.

In this latter case it would mean that the maximum error would not exceed 5 volts in every 100 volts. In my own case I used the ordinary spaghetti type. These are very convenient, as they take up very little space and, although other patterns can be used, these are really the most satisfactory.

The constructional work needs hardly any comment as it is perfectly straightforward. The ebonite panel measures five inches by five inches, and the large hole for the milliammeter can best be cut with a fret saw. A start for the saw is made by drilling a small hole.

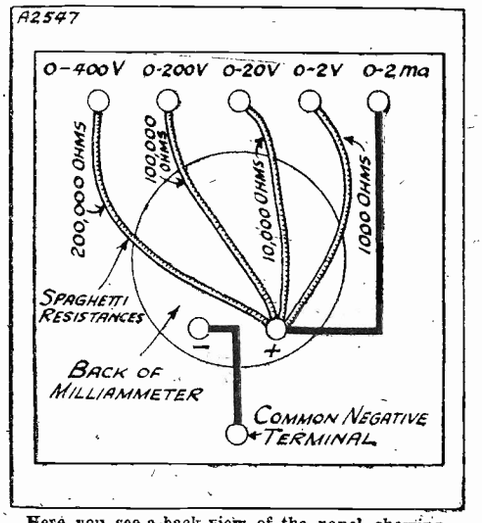
The Connections.

The box can be made very easily from ordinary three-ply, and can be knocked together in no time. Tiny brass brads are very useful for keeping it together, or if you can get small enough wood screws, perhaps these would be better. Only, if you use the latter, make sure that you make the holes for them first of all.

Before leaving you to get on with the good work, perhaps it would be as well for me to say a few words about the connections to the various terminals. You will notice one terminal all by itself at the bottom of the panel. This is the common negative, and is joined direct to the negative side of the milliammeter.

The extreme left-hand terminal at the top goes to the positive side of the meter, and enables the instrument to be used for the purpose for which it was originally designed. That is as a milliammeter. The remaining four terminals are each connected to one end of separate resistances. The values of these resistances in order are: 1,000 ohms, 10,000 ohms, 100,000 ohms, and 200,000 ohms. These give ranges of 0–2 volts, 0–20 volts, 0–200 volts and 0–400 volts respectively.

LOOKING AT THE BACK



Here you see a back view of the panel, showing how the various resistances are connected. When building this instrument it should be remembered that its accuracy depends on the accuracy of the spaghetti resistances.

LIST OF PARTS.

- **1 Panel, 5 in. by 5 in. (Permcol, Becol, Ready Radio, Peto-Scott).**
- **1 Cabinet to suit (see text).**
- **1 Low-range milliammeter 0–2 or 0–5 (Bulgin, Ferranti, Weston, Wates).**
- **1 1,000-ohm spaghetti resistance (Bulgin, Telsen, Peto-Scott, Varley, Lewcos, Sovereign, Magnum, Tunewell, Igranic).**
- **1 10,000-ohm spaghetti (Lewcos, etc.).**
- **1 100,000-ohm spaghetti (Varley, etc.).**
- **1 200,000-ohm spaghetti (Magnum, etc.).**

The free end of each resistance is now taken to the positive terminal of the milliammeter. All this is made quite clear in the wiring diagram, but remember that this diagram shows the instrument as it appears looking at it from behind.

When you have made up this little gadget you will be astonished at its usefulness. When I converted an old milliammeter that happened to be lying about, and was seldom used because of its low reading, I thought it might be handy, but it has turned out to be one of the most useful instruments that I have in my possession.

F. B.

AN IRON "IRON"

A Useful Soldering Tip.

"OH, dash, I've forgotten the iron!" Do *you* often use those words, or rather stronger ones, as explanation for the sprint to the kitchen which you then make, in a—usually—vain attempt to retrieve your soldering-iron before all the tinning is burnt off? If so, this scheme may help you.

A little while ago the writer tried his hand at making a soldering-iron, but as there was no copper available for the bit a piece of iron was doubtfully used instead.

Surprisingly Effective.

There was some slight difficulty in initially tinning it, but this was overcome by placing a small piece of solder on a block of sal-ammoniac, dropping a few spots of "killed spirits" on, and then rubbing this with the hot iron.

The completed iron "iron" functioned well—surprisingly so—with the very great advantage over copper-bit ones that no amount of heating impairs it's tinning. After keeping at red-heat for an hour a quick rub on the sal-ammoniac block (useful, by the way, for any soldering-iron) is ample preparation for more work. This success is, of course, due to the great affinity of tin for iron, and the softer the latter is, the better. Perhaps the only disadvantage is that when soldering large objects an iron bit does not appear to retain heat quite so well as a copper one, but for wireless work this is no drawback.

Try It Yourself.

When heating this iron don't wait for the flame to be tinged green, as with a copper one; it will turn orange instead.

If you are a "Doubting Thomas," I would simply say: Try this idea with a large nail, first. Copper soldering irons are a back number with me now, and this simple test should make you think so, too.

"CLED W."

CONE LOUDSPEAKERS

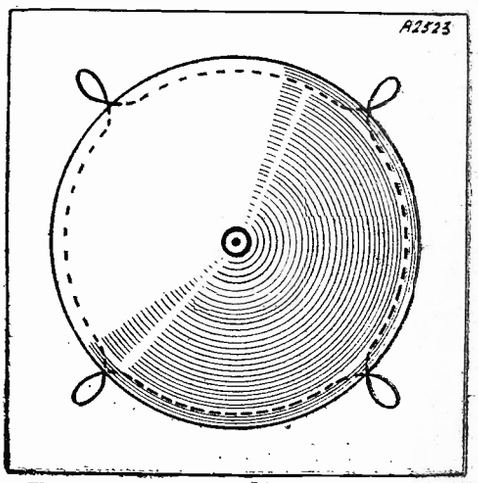
A description of a novel method of suspension.

FOR some time the type of simple cone on a baffle board, or mounted in a cabinet, seems to have become standard, but I think there is scope for considerable experimenting by intelligent amateurs.

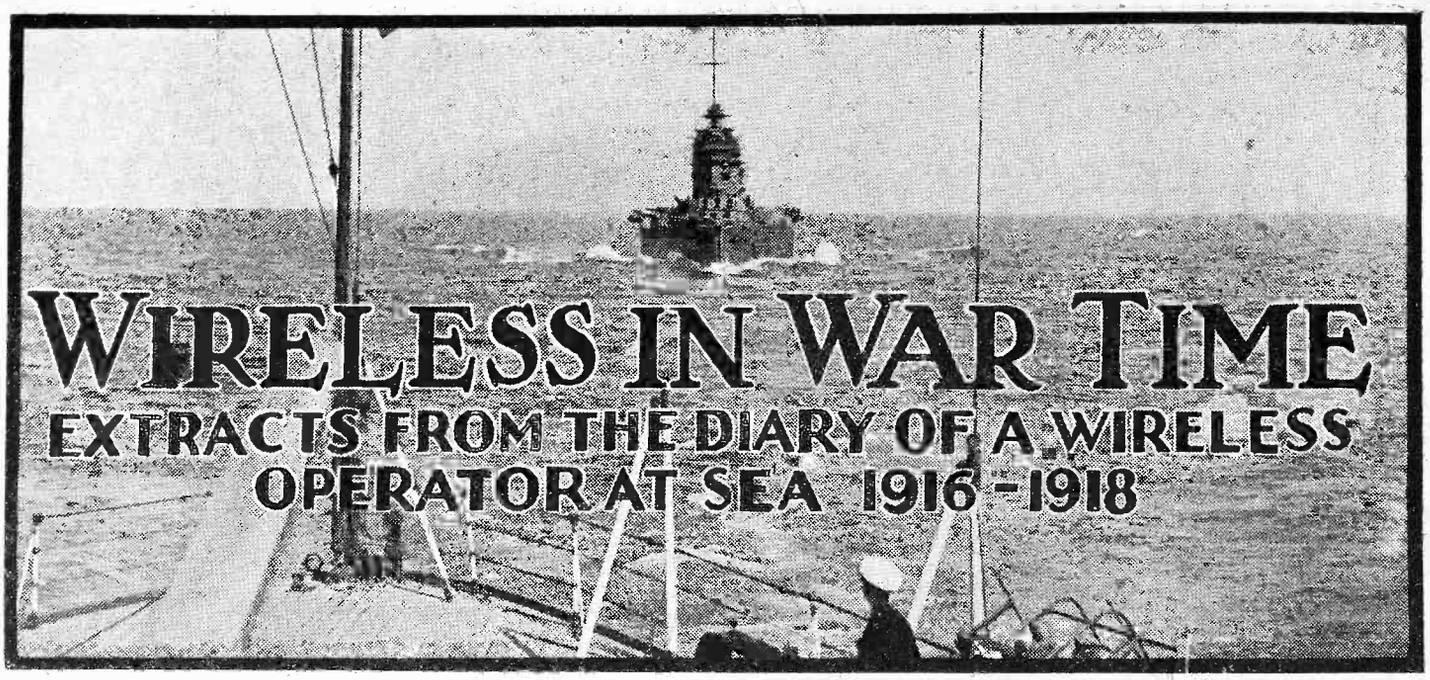
For Good High Notes.

The method of attachment of the folded cone often leaves much to be desired. The more free it is the better, and after trying all the methods, I find the best plan is to lace a thin string round the cone as shown in the sketch, bringing it out at four corners in the form of loops. The string must, of course, be glued to the edge of the cone so as to prevent the possibility of a "buzzy" rattle. The four loops are glued to the baffle board or cabinet front, and form an almost ideal type of suspension, as they offer very little impedance to a perfectly free movement.

SUPPORTED BY STRING



The cone is supported by the four loops, the string being continued round the periphery and glued firmly in place.



WIRELESS IN WAR TIME

EXTRACTS FROM THE DIARY OF A WIRELESS OPERATOR AT SEA 1916-1918

ON board His Majesty's Transport "_____."

Sunday, November 26th, 1916. I slept on board last night and woke to find the radiator spouting steam and hot water with fine gusto! Considering this is the first time I have slept in a bunk I was very comfortable. On duty in the wireless cabin for the first time. The set is a 1½ kilowatt Marconi Rotary Spark transmitter, with a Type 31a Crystal Set. The crystal is carborundum and, although not frightfully sensitive, seems to be pretty reliable.

Gun Practice!

NOVEMBER 27TH.—We sailed from Belfast this morning and, once out of harbour, the Captain gave orders for the gunners to try out our 4·7 gun. When the confounded thing went off I thought we had struck a mine, and quite expected it would be a case for an S O S and possibly a trial for a life-saving belt!

NOVEMBER 28TH.—A fairly uneventful day. I am on duty in the wireless cabin from 2 until 8, so altogether I get twelve hours on and twelve off.

NOVEMBER 29TH.—Have just come off duty after a six hours' spell. Received official warnings concerning dangerous parts of the Channel and as to the movements of two enemy submarines observed off Fastnet. Picked up the war news from Poldhu, and we were all glad to hear of the Zeppelin brought down in Yorkshire. It is very cold and blowing hard. 8 p.m. Spent an exciting half-hour, but a deuced cold one, on the Bridge, reading flashlight signals from one of our escorting tugs. Picked up signals from Crookhaven, St. Patricks and Poldhu, but missed the Eiffel Tower owing to bad jamming. Dined on porridge and fish and chips. I guess I shall be sick before long!

Some Good Yarns.

DECEMBER 2ND.—It has taken me about four days to recover from my first bout of mal de mer. At any rate, my dinner to-day consisted of two plates of oxtail soup (well dashed with H.P. sauce), a large plate of rabbit pie, plum pudding, biscuits and cheese, not to mention apples. They seem to feed us well on this boat, and I guess I've recovered. The Captain is rather worried about the submarine reports I hand to him from time to time. He has scarcely left the Bridge during the last twenty-four hours. At dinner to-day our Chief Engineer was telling some good yarns.

One was about a man who had a boiler burst near him and was practically skinned alive; but the doctors kept him in a bath of oil for seventeen weeks and he is now O.K. and has grown a new skin. Very few signals in the cabin to-day, and thank heaven for some magazines, otherwise it would be rather monotonous. The First Mate's opinion of the weather qualities of this boat are quite lurid, but for all that I like it, and we are getting to be good friends all round.

Field-Marshals, Generals, Admirals, Air Marshals, War Ministers, Ex-privates, Ex-sergeants, and, it would be true to say, literally hundreds of men who participated in one way or another in the Great War, have published their memoirs, or their diaries, or their recollections of "Those Stirring Days." But we think this is the first time that the personal story of a wireless operator at sea during war time has appeared in print, and we are pleased to begin publication in this issue of "Popular Wireless" of exclusive extracts from a diary kept by a young wireless operator who served at sea from November, 1916, until 1918. For various reasons he wishes to hide his identity under the nom-de-plume of "Sparks"—the nickname given to all wireless operators at sea; but the Editor is satisfied that these memoirs are perfectly genuine, and feels sure that many thousands of younger readers of "Popular Wireless"—many of whom were not born when this diary was written, and many of whom were, perhaps, in the nursery or at school, will appreciate these racy extracts dealing with those stirring times when the whole world was at war and when, in particular, sea-going life was an exciting adventure which young fellows of to-day might well envy.—THE EDITOR.

DECEMBER 3RD.—Received no news from Poldhu. By the way, signals are getting weaker. These carborundum crystals are not so sensitive as they might be. Noted with surprise that Mr. Lloyd George has handed in his resignation to Mr. Asquith, but has been asked to form a Government in conjunction with Mr. Bonar Law. I hear we are bound for Port Arthur, Texas, to collect oil for destroyers. With luck, we shall be back in England in February.

We Prepare For Trouble.

DECEMBER 4TH.—It seems we are going to call in at Halifax, Nova Scotia, in order to replenish our coal supply, which is rapidly diminishing at the rate of sixty tons a day. In spite of this high consumption, we only average eight knots. It is a sore subject with the Chief Engineer, who waxes very profane whenever it crops up.

DECEMBER 7TH.—Yesterday the Senior Operator received information from Cape Race (V.C.E.) concerning an armed German merchant cruiser last seen patrolling in the vicinity of 48°34 north longitude, 27°57 west. Now our position at the time of writing is 46°33 north, and it's on the cards we will meet her. At any rate, when I informed the Captain he had the boats prepared and swung clear. He next interviewed our gunner and gave him his instructions, and finally, he instructed the other operator and myself. The Captain forbade us to reveal any information to the crew.

A Cry In The Night.

We have also been warned as to submarines seen travelling north. Heard that Bukarest had fallen, but Poldhu is now very weak and soon we shall be right out of range. The ship is rather nervy at present, and I will quote an incident that occurred last night to prove the point.

I turned in at 8, but being a bit excited, promptly experienced a first-class nightmare and, about 9.30, I woke up and gave a most fiendish yell. At the same time I realised that it was only a dream, and lay back cursing myself roundly. But the yell was out. Instantly several doors banged and I heard the Captain's voice outside.

(*Continued on page 200.*)

NOTES FROM THE NORTH

A change of policy in North Regional broadcasting is observed by our northern correspondent in his monthly notes. He also explains the summer programme plans of the B.B.C. in this region.

LISTENERS who have followed the activities of the B.B.C. in the north of England during the past three years will perhaps have noticed a gradual change which has been coming over the complexion of North Regional broadcasting in more recent times; or perhaps the change may have escaped their notice because little, or nothing, has been said about it.

Local Talent.

There was a time when a large proportion of the energy of the B.B.C. officials in the north was concentrated on activities in the studio. When plans were prepared for the building of the North Regional high-power station, the Regional staff, fully aware of the plentiful talent available in the north, had visions of the fine programmes they would be able to present from the studios through the new transmitters.

Then the Northern Wireless Orchestra was disbanded by decree of Savoy Hill. Inevitably this placed a limit on studio activities. Improvements in the land-lines also facilitated the freer interchange of programmes between stations, and it became a matter for argument whether there was any reason why an orchestra playing in the Manchester studio should be any better than one relayed from the London studio.

For these, and other reasons, the North Region has been thinking less in recent times of studio productions, and more of outside broadcasting. Studio activities are, of course, continuing; but we have now, it seems, reached a stage in the progress of provincial broadcasting when it may well be argued that the first function of the Regional programme organizers is, by means of extensive outside broadcasting, to make their programmes a reflection of activities throughout their region.

Preparing for the O.B.'s.

The purse strings of the B.B.C. are firmly held by Savoy Hill, and whilst the headquarters officials have been known to raise objection to schemes for expensive studio programmes in the provinces, I believe that there is rarely, if ever, any objection to the expense involved in outside broadcasting of the sort that is now undertaken so extensively in the North Region—not only running commentaries and relays of outside concerts, but relays from theatres, music-halls, seaside pavilions, etc.

During the coming summer there will again be a big scheme of relays from holiday resorts. At the moment of writing, negotiations are afoot between the B.B.C. and Buxton, Bridlington, Whitby, Scarborough, the Isle of Man, Blackpool and other resorts.

The bands, orchestras, concert-parties and other attractions of these resorts have given great pleasure to northern listeners in past seasons, and this year it is anticipated that some of these programmes will also be relayed by the Midland and London Regional stations.

THE FIRST ENGLISH RELAY

This is a view of some of the apparatus of the Sheffield station, which was the first to be commissioned in England for relaying programmes. It stopped radiating when the North Regional started up.

The Isle of Man is again to figure in the North Regional programme, with a relay of the Senior Tourist Trophy motor-race in June; a broadcast of the ancient Tynwald ceremony, and other features of Manx life.

Alongside of this scheme the B.B.C. officials in the north are going in for fuller co-operation with theatres and music-halls. This commenced round about Easter, when the Manchester Hippodrome and the Leeds Empire were presented to radio listeners for the first time. These northern theatre relays are usually carried out very capably, and listeners may look forward to increasing enjoyment from this source.

As far as studio programmes are concerned, it is obvious that so long as concerts continue to be broadcast from provincial studios, an "orchestra" of nine players is too small for the presentation of any music much above the café-band standard.

The Northern Studio Orchestra is excellent as a stop-gap, but, in spite of the increased importance attached to outside broadcasting, studio concerts of a more substantial nature are still occasionally prepared. It has been decided to augment the Studio Orchestra regularly, once a fortnight. It will then be brought up to about 30 strong.

The Yorkshire Mummers and the Lancashire Mummers concert parties, broadcasting respectively from the Leeds and Manchester studios, are to continue as a regular feature of the North Regional programme well into the summer, and in addition the B.B.C. is organizing at Manchester a new concert party to be known as the Micro-Pierrots. This will have a different style to the other two parties which indulge considerably in the native dialects of the two counties.

No More Long Plays.

Long plays are to be discontinued during the summer, but there is a possibility of a number of radio pageants written round the history of certain towns such as Durham and Chester. Whether these programmes will materialise depends largely on opinions regarding Mr. L. du Garde Peach's "Pageant of York," broadcast on April 6th.

The alterations to the old Quaker Meeting House at Leeds which is being converted into studio and control-room premises are now well on the way, and the new underground land-line route from Leeds to Edinburgh via Newcastle is now in use.

Programmes relayed between England and Scotland follow this route instead of the old overhead land-line from Leeds to Glasgow.

A quite remarkable feature of broadcasting in Yorkshire lately has been the extraordinary growth of listening groups. In October last there were 45 groups which regularly listened to broadcast talks. There are now 145.

Fourteen Yorkshire Schools of Art listen to the Tuesday evening talks on art, and an instance of the enthusiasm with which this sort of thing is being taken up in Yorkshire is provided at Keighley, where a choir of some 50 people is listening to Mr. Victor Hely-Hutchinson's Monday evening talks on music.

A Whole Time Job.

Yorkshire is the only county which has its separate Area Council for Broadcast Adult Education, and at Leeds there is a B.B.C. official who gives his whole time to the secretaryship of this Council and to organizing group listening amongst the unemployed.

On April 2nd a conference for members and leaders of Yorkshire's 145 groups was held at Leeds. Professor J. Strong, of Leeds University, gave an address on "The Place of Broadcasting in Adult Education," and Mr. R. A. Rendall of the B.B.C. spoke on the winter and summer programmes.

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.

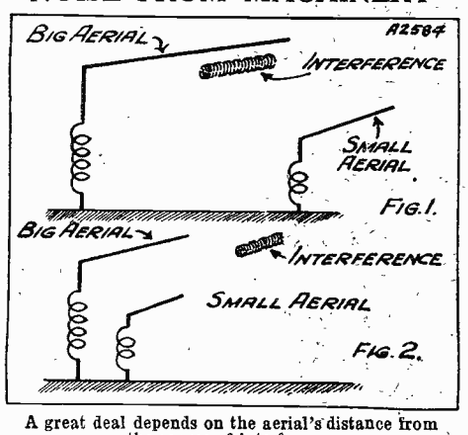
The Better Aerial for Dodging Interference.

B. J. U. (Lancaster Gate).—"I use a fairly sensitive receiver for reception of the main continental and several of the English stations, and although the selectivity of the receiver is quite good, I am greatly troubled by interference from machinery situated locally.

"Which would be the preferable arrangement of the aerial, a large outside aerial with means for obtaining adequate selectivity in the receiver, or a small indoor aerial with fairly tight coupling to the receiver? Which arrangement should give the greatest freedom from the interference experienced?"

It's very difficult to say. Sometimes the interference-producing machinery radiations are very local and die away quickly,

NOISE FROM MACHINERY



A great deal depends on the aerial's distance from the source of interference.

in which case a small indoor aerial would be better. This is true in degree always.

But much depends upon how close you are to the interference. If very close you can weaken it by moving relatively quickly away from it, *i.e.* by increasing the distance of your aerial from the interference by a large ratio.

If you are already aerial dimensions away you won't make much difference in drawing in your horns as it were. In Fig. 1 you have altered the relative distance from the aerial very much by using the small one. In Fig. 2 there is hardly any difference in relative distance of the two aerials, but the small one may be a tiny bit better.

* * *

Amplification and Power Output.

L. A. L. (Andover).—"Can you tell me how I shall know whether I ought to use a super-power or an ordinary-power valve. This is what puzzles me:

"There are two valves by the same maker, one of them has an amplification factor of approximately twice the other and needs only half the grid bias. If I get a valve with the higher amplification factor, I ought to get more magnification, and in consequence there is no need for me to apply such a big signal to the grid as would be necessary in the case of the valve which has only half the amplification factor.

"Why is it necessary to use a valve in the last stage capable of handling a big swing, when one loses so much in amplification by using a valve of this type?"

* * *

It's Power That Counts.

Amplification is not *power*. I could get a valve requiring a grid sweep of 0·5 volts to apply 200 A.C. anode volts to my loudspeaker. *But* the loudspeaker demands power, and the valve I mention might not give that power.

Again, high-amplification valves have high internal impedance. Most loudspeakers have relatively low impedance at lower frequencies. So a high-impedance, high-mag. valve, in not matching the impedance of a loudspeaker load, is not efficient, and will not deliver the required power.

If I use a step-down transformer, then its all right as far as matching goes, but I have to drop the volts applied to the speaker, and it again comes down to what power I have available.

You have 230-volt mains. You light all your lamps and warm the house by electricity from these mains. At least, let me assume this.

You have a motor car which has a magneto. That magneto absorbs hardly any real power to drive it, but it may deliver 100,000 volts! It wouldn't do any good to substitute the magneto for your mains, even though it is a very high mag. device!

Power—Power—Power—Power! and power is volts × amps—(with unity power factor, anyway).

* * *

Using Enamelled Wire.

"CURIOUS" (Cheam).—"Recently I erected a new aerial. The wire used for my old aerial was ordinary 7/22 hard-drawn copper, and when I went to my dealer he suggested that this time I should use enamelled copper, because he said it was much better.

"I cannot understand this because I should have thought that the enamel covering on the wire would have resulted in a loss of volume, since I understand that the enamel used is a good insulator.

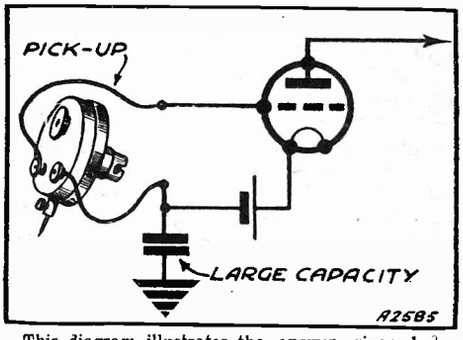
This is curious—same question cropped up again! It's easy; same answer twice.

Why should an insulator shield waves? The air is an insulator, but the waves go through the air all right. Brick is an insulator—some of us use indoor aerials. Wood is an insulator, but a portable set picks up its signals through wood.

A painted portable picks up energy. An enamelled portable would pick up energy. So an enamelled wire will pick up energy.

Good enamelled wire is quite satisfactory for aerial wire.

STABILITY WITH A PICK-UP



This diagram illustrates the answer given last week to J.M.D. (Belfast), explaining how a pick-up may be earthed through a condenser to improve stability.

Hiss from a Super-Het.

P. R. (Salisbury).—"My receiver is of the super-heterodyne type, and its sensitivity is very good. I find, in fact, that it is too good, because, if I attempt to use all the H.F. amplification on weak signals, reception is accompanied by a hissing noise which borders on a mild roaring.

"What causes this noisy background?"

I should be sure (1) That the oscillating valve is biased well negative, and never allows grid current, and (2) see that you inject the new local oscillations as far up the chain of first amplifier as possible.

Thus you can introduce the oscillations at the central point, then magnify the resultant, then do the first detection. It is better to do the amplification of the signal at that signal's frequency first, then inject the local oscillation and immediately do the first detection, otherwise you amplify hiss from the oscillator.

MIRROR OF THE B.B.C. By O.H.M.

THOSE NEWS BULLETINS

SCOTTISH ORCHESTRAS—MR. HUGH JOHNSTON STICKS IT—P.M.G. AND THE B.B.C.—THE MOVE TO BROADCASTING HOUSE

I HAVE been listening a good deal lately to the news bulletins, comparing them with their predecessors of six years ago or so. It seems to me that the bulletins have drifted into a kind of routine rut. There is hardly the degree of originality and independence that one would expect from the fact that the bulletins are now actually compiled and edited at Savoy Hill. No doubt the substantial news is covered, but it might be done with more vivacity and lightness.

Scottish Orchestras.

All is not serene in Scotland over the B.B.C. intervention to establish and support a new National Orchestra north of the Tweed. Sir Hugh Robertson has become the spokesman and leader of the active critics.

Sir Hugh states that the Music Advisory Committee of the B.B.C. in Scotland was not consulted before the scheme was launched, and that one result of this absence of consultation is that the new B.B.C. enterprise will cripple worthy existing orchestral activity without providing an adequate replacement. It looks as if Sir Hugh and Mr. David Cleghorn Thomson are in for a battle royal.

Mr. Hugh Johnston Sticks It.

The Rev. Hugh Johnston, rector of Cranleigh, the originator and inspirer of the daily morning service, has managed so to adjust his parochial duties as to enable him to continue with his broadcasting. These morning religious services remain one of the most popular and most generally appreciated features of the programmes. The Rev. "Pat" McCormick, of St. Martin's, is Mr. Johnston's partner in this work.

P.M.G. and the B.B.C.

There are persistent rumours that relations between the Postmaster and the B.B.C. are not as smooth as they might be. Lobby gossip has it that the Treasury covets the B.B.C. funds, especially since seeing the balance sheet for last year, which reveals a remarkably healthy state of affairs.

Members who are hostile to the B.B.C. are exploiting the situation in the hope of crippling their *bête noire*. On the other hand, friends of the B.B.C. are not inactive, and I do not anticipate a victory for the "antis." Still, the B.B.C. would be better advised to take the public more into its confidence on this subject of finance, which has been guarded too carefully in the past.

Interchange of Programmes Between America and England.

The long-awaited and much-discussed interchange of broadcast programmes between England and America is at last beginning to take place. I was afraid nothing much would come from the talk that has been going on ever since broadcasting began.

Although one felt that something would be accomplished after Sir John Reith had stated that something was to be done in the matter on his return from the United States about a year ago. A series of what are called "reciprocal" programmes has been suddenly fixed up between the B.B.C. and the Columbia Broadcasting System of the United States.

By the time this note appears the Columbia people will already have given British listeners a talk on Friday, April 22nd. American listeners are to hear a performance of "Comus," which goes out from London Regional at 11 p.m.

Two classes of programmes will be broadcast under the new arrangement, described as "informative" and "characteristic," one being to tell something and the other to show it.

Thus, the Columbia talk comes under the definition of "informative," and "Comus," which is designed to show what British broadcasting can do to put the music and poetry of Arne and Milton on the air, as "characteristic." I understand that later in the series British listeners are to have a programme in which an attempt will be made to give a radio impression of Broadway, and that in return we shall treat our American cousins to a similar entertainment founded on the atmosphere of Leicester Square.

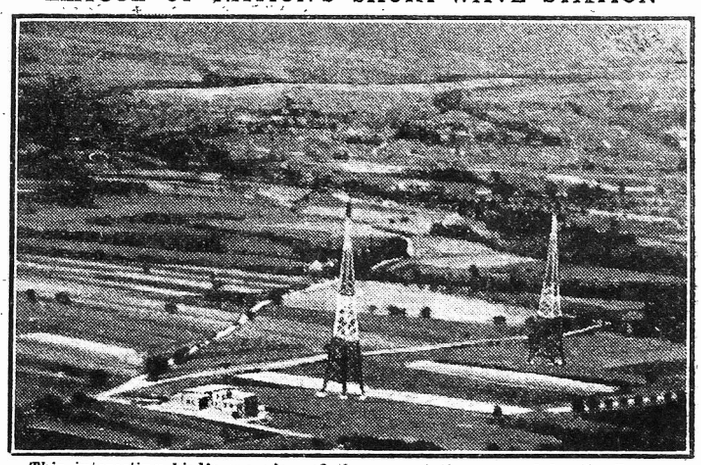
The series will run for eight weeks, during which time two talks will be given in America and two in England, on the common subject of "school" and "college" life in the two countries. Each programme will last for thirty or forty-five minutes, and will start at 11 p.m.

The Move to Broadcasting House.

From what I hear the change over of the Publications and Programme staffs from Savoy Hill to Broadcasting House at the

(*Continued on page* 200.)

LEAGUE OF NATION'S SHORT-WAVE STATION



This interesting bird's-eye view of the new station opened by the League of Nations was taken from the Stuttgart-Geneva air liner as it was passing over the Swiss town of Prangins.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

THE mid-week vaudeville hour hadn't anything of outstanding merit, and there was certainly nothing new in the way of songs. All the artistes relied on popular melodies. Max Miller was amusing in some new jokes, most of them at the expense of his wife.

Carr Lynn went through the farmyard as mimics do, and a visiting circus in the neighbourhood gave him an opportunity to introduce some of the wilder animals. In these he was very clever. Elsie Carlisle crooned love-songs which made me writhe—the studio audience, on the contrary, liked her.

Jenny Howard and Percy King, in the "Street Singers," were a lively pair, especially Jenny Howard, who aimed at something reminding one of Cecily Courtneidge and that one-time popular music-hall artiste, Harry Weldon.

Johnson Clark, the ventriloquist, hadn't anything better than the bewhiskered story of the squire with the long beard, and the query it raised as to whether he puts it over or under the sheets at night. Again the studio audience laughed heartily. Really, it makes one wonder where such people come from! Lastly, Rudy Starita played vibraphone and xylophone solos,—and very well, too—but Teddie Brown's recent wireless activity must have robbed this turn of some of its appeal.

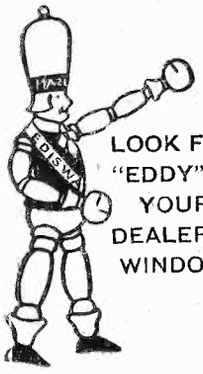
* * * *

Sir Daniel Hall's fortnightly talk on "Farming" was as virile as ever, and it will not be his fault if there isn't a revival in

(*Continued on page* 202.)

HL2

METALISED



LOOK FOR "EDDY" IN YOUR DEALER'S WINDOW

Further evidence of the supremacy of the new range of 2-volt Mazda valves is here in the metalised H.L.2. Extreme sensitivity joins with absolute stability, and its high amplification coupled with a comparatively low impedance renders it particularly efficient as a leaky grid detector or intermediate L.F. amplifier. The steep slope of the H.L.2 also makes it suitable for use as an anode bend detector.

Mazda valves are 100% British made and designed by British engineers.

THE AMAZING

MAZDA

THE BRITISH VALVES

EDISWAN RADIO

ANOTHER BIG ACHIEVEMENT IN THE NEW MAZDA 2-VOLT RANGE

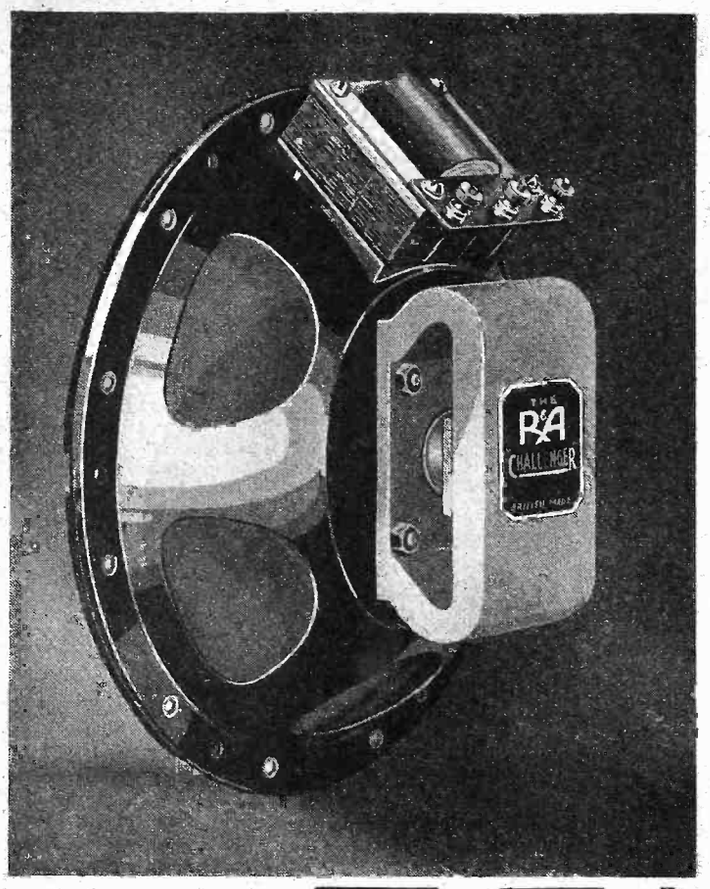
MAZDA 2-VOLT RANGE

H.210	7/0	PEN.230	17/6
H.L.210	7/0	PEN.220	17/6
★ H.L.2	7/0	PEN.220A	17/6
★ L.2	7/0	S.G.215	16/6
P.220	8/9	★ S.215A	16/6
P.220A	12/0	★ S.215B	16/6
P.240	12/0		

★ METALISED

THE EDISON SWAN ELECTRIC CO. LTD.
RADIO DIVISION:
155 CHARING CROSS ROAD, LONDON, W.C.2

V.144



The R & A 'Challenger' notwithstanding its phenomenally low price, will, given an undistorted input, reproduce speech and music with absolute fidelity. Its sensitivity is such that it gives satisfactory results when used with the average power valve, and it will accept 3 Watts undistorted A.C. without distress, thus providing a volume of reproduction more than sufficient for normal requirements.

35/-

INCLUDING

MULTI-RATIO FERRANTI TRANSFORMER

(TO R&A SPECIFICATION)

BRIEF SPECIFICATION:—

CHASSIS.	8½" diameter, pressed steel, stove enamelled black, fitted with felt facing sectors.
DIAPHRAGM.	6½" diameter, moulded in one piece with surround.
COIL.	1" diameter, 6.7 ohms impedance at 1,000 cycles.
MAGNET.	Forged 15% cobalt steel, cadmium plated. Flux density 6,800 lines per square centimetre.
TRANSFORMER.	Bolted to chassis. Ratios 19, 33 and 44 to 1, large core, sectional primary winding. Made by Ferranti Ltd. to R & A specification.

Your Dealer will gladly demonstrate. Write us for Descriptive Literature.

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The R&A "CHALLENGER"

PERMANENT MAGNET MOVING COIL REPRODUCER.

"QUEEN of BRIDGE"

Let Mrs. CULBERTSON Teach You CONTRACT

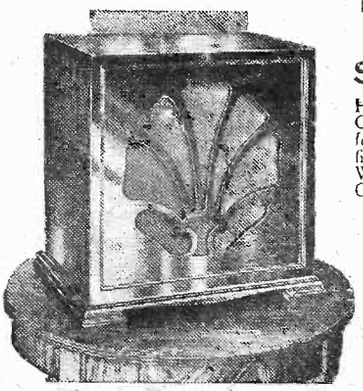
Of course you play bridge. These are days when everybody *does*. And now Contract is the game. A little more difficult than Auction, but how very much more fascinating! Mrs. Culbertson will teach you. Her famous husband declares that she is "the greatest bridge player and teacher in the world."

The first of her series of lessons appears in the MAY issue of the NEW LONDON MAGAZINE.

The NEW

LONDON Magazine

Buy the MAY Issue To-day. **6d.**



THE CABINET THAT MAKES A GOOD SPEAKER BETTER!

Here is the Camco "Melodee" Speaker Cabinet—built to IMPROVE speaker performance. In Oak, Mahogany and Walnut finish, from **22/-**.

Write now for your FREE copy of the 1932 Camco 24-page Radio Cabinet Catalogue to:

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Every CAMCO Cabinet bears the CAMCO Seal

Do you ever hear the Cowbells or the Siren ?

A "hot break" in the theme—that is the chance for the expert drummer. Now you'll hear the cowbells and the siren—interpreting the "falling" rhythm—introducing naturally that vocal chorus—that is what they're for! You'll hear them clearly, distinctly, *recognisably* if you use the pure and powerful current of an Improved Lissen Battery. The extraordinary power output of this battery makes noticeably true the performance of your loud-speaker.

Ask by name for an Improved Lissen Battery. Obtainable at every radio dealer's.

THE SECRET OF THE TEST TUBES

There is a Process used in the Lissen Battery which not only produces power of remarkable purity, but which gives the battery very long life. So much so, that a PRINTED LIFE GUARANTEE is given with every Improved Lissen H.T. Battery sold. See this guarantee on the side of the battery when you buy—it means extra useful battery life in your set.

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

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

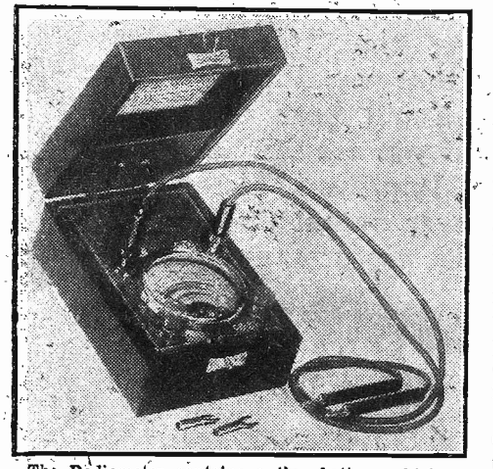
Tested and Found—?

A "PIFCO" ALL-IN-ONE RADIOMETER.

MANY radio enthusiasts must find themselves on the horns of dilemma in regard to measuring instruments. On the one hand are those inexpensive combination types of meters which, though they fulfil the requirements of the average listener, are not sufficiently accurate or suitable for "mains" and other more exacting tasks.

Alternatively, it is possible to obtain instruments which will cope with anything

THE DE-LUXE MODEL



The Radiometer contains a tiny battery which enables continuity tests to be made.

—but are beyond the reach of most of our pockets.

However, there is now a solution to the problem in the form of the De-Luxe Model of the "Pifco" All-In-One Radiometer. This compact instrument will measure or test practically everything the radio amateur encounters.

It will measure H.T. and L.T. voltages up to 250 and 6 volts respectively and M/A up to 40, and valves and components can be tested for continuity.

H.T. mains unit outputs can be measured, for the device has a resistance of 125,000 ohms. And despite its compactness accurate readings are possible, for it has a mirror scale and knife-edge pointer.

Complete in a maroon bakelite case and with leads it costs £2 2s. 0d., and at that we consider it represents excellent value for money. We have compared its readings with those given by our separate (and costly) test meters and find its accuracy to be of the order claimed.

It is an instrument which we can recommend.

THE TRIX "ELASTICATOR."

With all the dozens of stations which are nowadays operating on the medium wave-band, some method of logging their dial readings is essential. An excellent alternative to the rather laboursome plotting of curves is the "Elasticator" made by Eric J. Lever (Trix) Ltd., and retailing at 3s. 6d. each.

It comprises a scaled rubber ribbon which you stretch out to make three or so noted readings correspond with any one of three station lists prepared according to the three types of condensers in most common use.

Then all you have to do is to read off the probable dial readings of any other stations you wish to tune in.

An ingenious article, and one which I find works to very close degrees of settings on an average type of set.

BULGIN AGAIN.

You remember that "Quickwyre" which I recently described in "P.W."? Well, Bulgins are applying the principle to a "self-soldering" conductor. It is known as "Soldawyre," and comprises six strands of tinned copper wire and one strand of solder, so that all that is required is a little flux and a hot iron to make a sound joint.

The "slip-back" covering is in this case impregnated with a special wax compound which gives it sufficient strength to "stay put" when pushed back, so that the heat occasioned by the soldering does not cause it to fray.

"Soldawyre" costs 6d. per 8-ft. coil in either red or black, and it should be noted that you don't *have* to solder it, it makes a perfectly good conductor for terminal screw connections.

NEW WATMEL POTENTIOMETER.

This is of the wire contact type, having a composition element and it is obtainable in the usual values. It is a particularly robustly constructed component and embodies several original and sound features of design.

The price is 4s. 6d. and on test we found samples to be perfectly satisfactory in every way.

Its movement is velvety, and you have the comforting knowledge that this smoothness is not obtained at the expense of contact reliability.

THE BLUE SPOT INDUCTOR.

There is always at least one firm in every branch of industry which is a "safe bet." You know what I mean? A man asks you "Who makes good, inexpensive cameras?" or "Who makes good motor tyres?"

A name immediately occurs to mind—the answer is easy. But if the question were "Give me six firms you can recommend" you would find it more and more difficult to discriminate as you searched round in your mind for the last ones of the list.

Applied to radio we can provide an excellent example of the above by asking "Who makes good loudspeakers for sale

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.

at prices within the reach of all?". We don't think anyone would quarrel with "Blue Spot" as the answer to that!

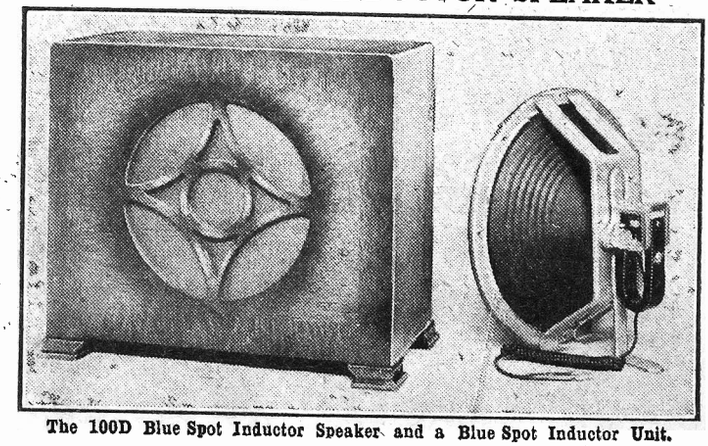
And this is why we are so pleased that Blue Spot are in production with speakers of the "Inductor" type, for their range is now complete.

Of course, the prices are right; 39s. 6d. for the complete chassis, and 63s. for the complete 100D loudspeaker in a fine oak cabinet.

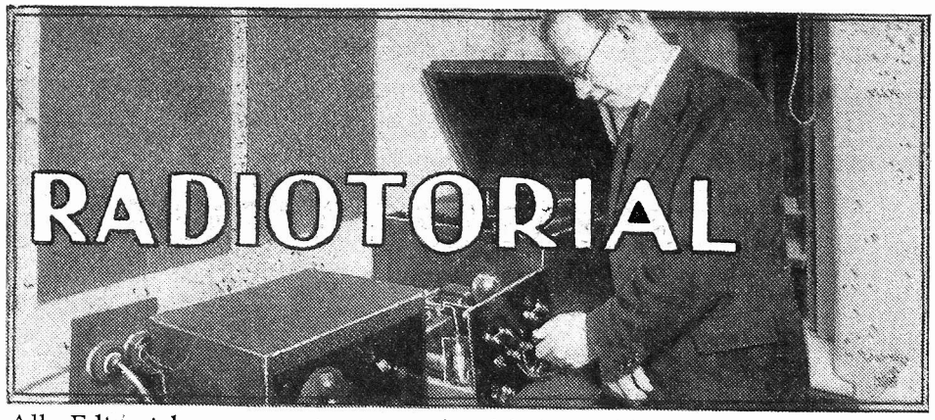
This last I have in front of me as I write, in active use in connection with our new inter-office loudspeaker communication system, from which you will gather that I like it!

It is, in fact, a first-class speaker, sensitive, clear and full-toned and one which you can use with excellent effect with any class of set.

AN EXCELLENT INDUCTOR SPEAKER



The 100D Blue Spot Inductor Speaker and a Blue Spot Inductor Unit.



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

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

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

QUESTIONS AND ANSWERS

CUTTING OUT THE SCRATCH.

A. D. (Watford).—"The only fault I have to find is that when switched over to gramophone I get rather a lot of scratch in the background. I think it is due to the particular pick-up I use, as the only other case I know where a similar result is obtained is in that of an acquaintance of a friend of mine who uses exactly the same make as mine, and also gets a little too much scratching noise.

"I am told that in his case it was overcome by a resistance of the anode-resistance type, this being connected to the pick-up, and I should like to try this if you can give me the connections."

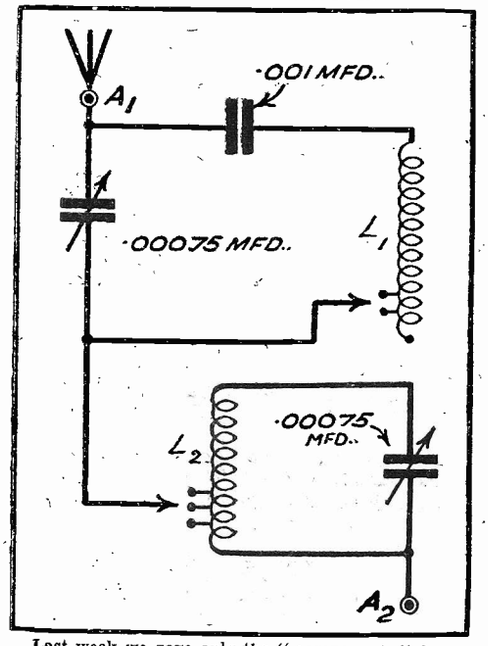
In all probability the high resistance was connected across the terminals of the pick-up in order to flatten the response and make it less peaky, and any form of good quality high resistance will be O.K. for this. The most satisfactory value will depend upon the pick-up in question, but will probably be round about the 50,000 to 100,000-ohms mark.

A potentiometer of this value, with its slider connected to one side and one end to the other side of the pick-up, is just the thing, and it could be adjusted to give the best results in a moment. As it is improbable that the resistance value will be found critical, you would probably notice an improvement if you connected any high resistance, such as a spaghetti of about the values mentioned, across the terminals.

If it is then found that only certain records give trouble, you can easily wire an on-off switch in series with it, so that it could be cut out of circuit in a moment when it was not necessary.

MISSING LINKS, No. 32

BROOKMANS REJECTOR.



Last week we gave only the "components" for a Brookmans Rejector, and above these are shown "wired up" into a complete circuit.

DID YOU GET THE WIRING RIGHT?

AN EXPENSIVE EXPERIMENT.

"FIREWORKS" (Ipswich).—"Being an ardent experimenter, I have more than once had some spectacular fireworks to deal with when playing about with circuits, but I generally find the lesson is well worth the cost. My latest adventure has cost me a milliammeter, and I am still wondering how! So I should be glad if you could explain to me just why it blew up.

"I am using a full-wave rectifying valve in conjunction with a home-made mains unit, and the usual smoothing, consisting of two large chokes and three large condensers. The two large chokes are in series with one another, and one is connected to the centre tapping on the filament point of the rectifier transformer in the usual way.

"One condenser goes also to this point, another condenser to the junction between the two chokes, and the third to the other side of the remaining choke. The three other terminals on the condensers are joined together and taken to the centre tapping on the high-tension winding of the transformer.

"I should explain that normally the unit delivers 30 milliamps, but lately it has seemed noisy, and I had an idea that one of the large smoothing condensers had broken down.

"With the milliammeter connected in the H.T.— lead of the set, I found that 28 milliamps were passing, which is a little lower than usual, so I thought I would try the milliammeter (which is one of the 50-milliamp type) in the negative lead from the rectifier, to see if there was any loss in the smoothing apparatus.

"On opening up the mains unit the most convenient place to insert it appeared to be the centre of the high-tension winding and the lead which goes off from there to the three smoothing condensers; and as the instrument carries 50 milliamps and the unit only supplies 30 milliamps, I thought it would be quite O.K. to try it here. So I inserted it with correct polarity, and switched on.

"The moment I did so the needle went over with a sharp bang which broke it. And although I switched off instantly, the damage was done, and the milliammeter is still showing 50 milliamps!

"Could you tell me why such a big current should flow, as apparently the connections were quite O.K. and nothing shorting anywhere? After taking the milliammeter out, I joined up the lead to the centre of the transformer again and switched on, when the set went just as before.

"I must say I was rather surprised at this, for I thought that some sort of shorting trouble had developed when the milliammeter needle went over with such a bang. I should be glad if you could give some explanation for this."

The explanation is that your smoothing chokes and condensers really do smooth the current. If the unit is to deliver a steady 30 milliamps direct current and its input is *not* direct, it is quite obvious that during the time the input current is flowing it must be greatly in excess of 30 milliamps in order to make up for the time when it is not working. In short, in order to get 30 milliamps delivered *steadily* from the output, the intermittent input current must be very much larger during those moments when it flows.

And, quite apart from this question of an average output requiring high value intermittent input, there is the more important charging effect of the condensers to be considered. It will be obvious that if, when normally working, the instantaneous input current values are higher than the average output values, they will be enormously greater at moments when the unit is first switched on.

(*Continued on page 200.*)

"P.W." PANEL, No. 68. USING A.C. VALVES.

When using the 5-pin type A.C. valves it is necessary to be particularly careful in wiring the valve holders.

* * *

Before they are fixed make sure that all the nuts are tight, as the multiplicity of leads makes it almost impossible to tighten a loose terminal on such a valve holder once it is in position.

* * *

Metal baseboards are often used with this type of valve, and it is advisable to place a piece of stout cardboard or other insulator under the valve holder to prevent accidental "shorts."

* * *

Also be careful that neither the soldering tags nor "whiskers" on the connecting leads can bend down and touch the metal baseboard.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 198.)

At the moment of switching on you had the three large condensers, amounting to perhaps 6 or 12-mfd. capacity, across the rectifier, each taking a large current. When joined thus in parallel the three take an enormous current momentarily until they are charged.

Even if the milliammeter had been connected to the output lead of the rectifier, instead of the input, it might have had a sudden rush of charging current to contend with, when the by-pass condensers *in the receiver* were being charged at the moment of switching on: but this would be absolutely trivial compared with the large current which would flow from the actual rectifier to the smoothing circuit, with its very much larger condensers, and it was the large charging currents to these that "blew" your milliammeter.

MODERATING THE "COMET" III.

The number of readers asking for particulars of the re-wiring of the "Comet" Three to include a Moderator is so great that the best way to reply to them is to take a typical instance and describe the whole process minutely enough to satisfy all enquirers.

We will suppose then, that you have your "Comet" Three in front of you, constructed exactly as per the blueprint that was given away with "P.W." The set is out of its cabinet, and has its back turned towards you, so you are looking straight at the "P.W." Dual-Range Coil.

One of its terminals (right) is marked S1, and is connected to a ·002 mfd. condenser, to the moving vanes of the tuning condenser, and to one contact on the wave-change switch.

The first thing to do is to undo S1. But leave the two condensers and the wave-change switch still connected together.

Then run a shortish flex lead from that terminal of the ·002 mfd. condenser which was formerly connected to S1, to the terminal on the Moderator coil which is joined to one end of its winding.

And to this same end of the Moderator winding, run a lead to one side of the Moderator condenser.

(We are assuming that you will mount this condenser just beside, or above the wave-change switch on the panel, where it will most conveniently be handled.)

Now join S1 terminal on the dual-range coil to the other end of the Moderator coil (flex tapping terminal), and to the other side of the Moderator condenser.

Then carry on as explained in the articles on Moderating, varying the tap and the position of the Moderator coil until you have found the best place to stand it relative to the dual-range coil. Try the effect of the alterations on long waves, as well as on the medium waves, and also try the effect of "unplugging" the Moderator tapping altogether on long waves, as well as varying it from one tapping to another.

Don't forget to disconnect your batteries before starting on any of the alterations, and be careful not to damage the other wiring in your anxiety to get the moderator going.

"MODERATING" REPLIES IN BRIEF.

W. B. (Faversham).—The "Comet" Two is moderated in the same way as the "Comet" Three. (See reply above for details of this.)

* * * *

T. A. J. (Ramsgate).—It is better to connect the aerial to A on the unit, and then moderate, as is explained above.

* * * *

A. E. W. (Bermondsey).—See answer to other correspondents in Radiotorial columns for the method of connecting to S1. You should retain plenty of the volume and get adequate selectivity as well by experimenting carefully with the position of the Moderator coil.

WIRELESS IN WAR-TIME

(*Continued from page* 185.)

"My God!" he said. "What was that, T——?" (T—— is our First Mate.)

"Lord only knows," said T——, with chattering teeth. "Sounded as if some fool had fallen overboard."

Presently the Chief Engineer, one of the stewards, and the Second Mate came running up. It appears that I had been heard nearly all over the ship. Anyway, they started a search, but when they looked in my room I produced an excellent snore and they retired. When I told them all about it this morning they laughed heartily.

Here is another incident. This boat being an oil tanker, it contains some huge cylinders, which are at present empty. One of the men was cleaning one of these cylinders this morning but somehow dropped a pail. The effect produced was a noise like ten thousand thunder-claps.

From out of the stokehole door a dozen or so inky black figures came scurrying like frightened rabbits, all pretty white beneath the dirt. Old T——, who had stepped into the wireless cabin to light his pipe and have a chat with me, jumped up with an oath.

"Hell's flames!" he cried. "The swine have got us!"

And I must say it sounded like it. It gave me quite a scare. But after the Mate and the stokers had given the unfortunate fellow who had caused the disturbance their opinion of him—and couched in no uncertain terms—and had finally reduced him to a state of cowering imbecility, we all sobered down. But everybody's temper is a bit raw, and later on, when one of the crew interviewed old T—— and complained about the food, old T—— replied with a snort:

"Look here, if the meat is good enough for us, it's good enough for the likes of you. Some of you —— chaps wouldn't be satisfied with the baked wing of a —— angel!"

One can't help laughing.

TECHNICAL TWISTERS

No. 110.—TRICKLE CHARGING.

CAN YOU FILL IN THE MISSING LETTERS?

The trickle charge differs from ordinary battery charging chiefly in two respects—the duration of the charge is much . . . . . and the charging rate much . . . . . .

* * *

The method enables the battery to be . . . . . in good condition by daily replenishing the overnight losses.

* * *

If the battery is in good condition when installed it need never . . . . . but can be kept in tip-top condition by regular . . . . . .

Last week's missing words (in order) were: Advantages, Matching, Steady, Matching, Choke, Transformer, Ratio, Assist.

MIRROR OF THE B.B.C.

(*Continued from page* 188.)

beginning of this month went off without any more trouble than one expects from such upheavals in the routine life of people accustomed to finding things in the morning as they left them overnight.

This was mainly because the majority of the staff found conditions at Broadcasting House rather better than they had been led to believe would be the case by the people connected with other departments of the Corporation who had already been in their new quarters at Langham Place for some months and who on their visits to Savoy Hill told tales of filth and dirt in the offices and chaos caused by workmen swarming about the half-finished building.

Interior Work Nearly Completed.

There is no doubt that the earliest arrivals at Broadcasting House did have a particularly rough time, what with the noise and disturbance created by the hundreds of men engaged on getting the interior of the building ready for occupation, but most of this work had been finished before the end of March.

Some amount of hammering and banging will go on for a long time yet, but this will be no worse than the noise of the pneumatic riveters to which the staff had to listen for some months while at Savoy Hill during the erection of the new Shell-Mex building on the Hotel Cecil site, and the big block of offices now nearing completion in Savoy Street and Waterloo Place.

Generally speaking, therefore, Broadcasting House has turned out to be rather better than most people anticipated, which is decidedly beneficial for the morale of the staff, who shouldered many little inconveniences like good scouts.

I happened to be at Savoy Hill when preparations were being made for the move, and saw what was going on in several rooms. All papers and documents were being carefully looked over and tied into neat bundles ready for placing into hundreds of chests bearing numbered labels of the rooms to which they were to be deposited at Broadcasting House.

How the Move Was Made.

Such a clean up is very desirable at times because it provides a glorious opportunity of getting rid of so much unnecessary and unwanted stuff which would otherwise be retained.

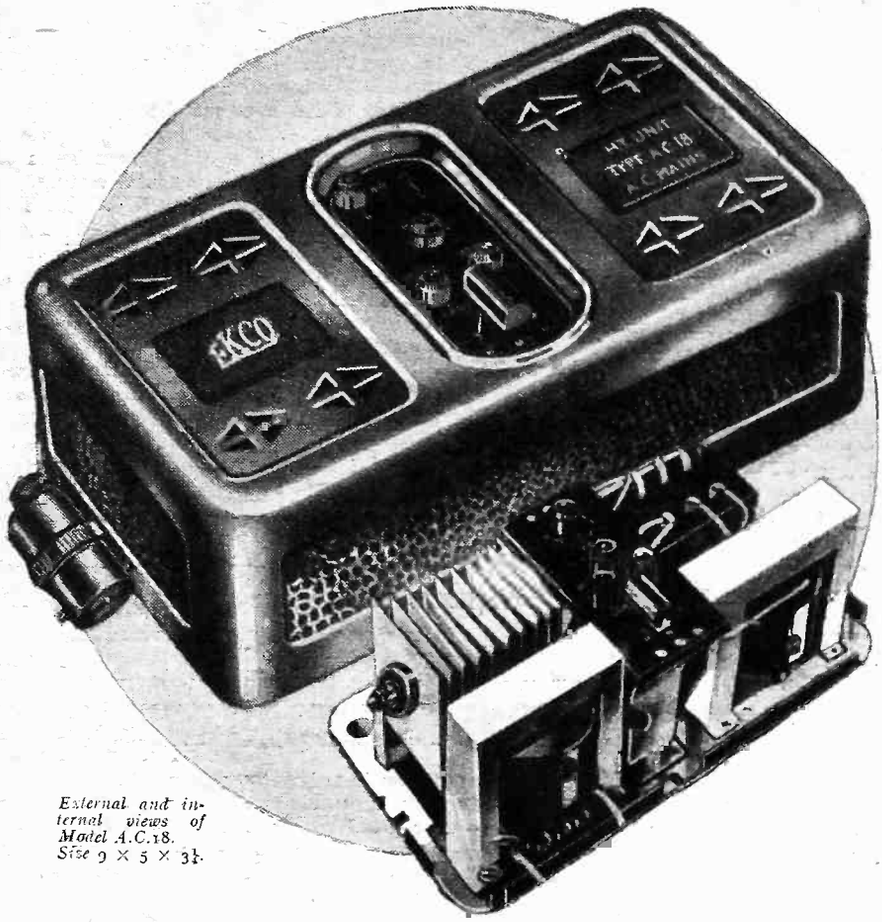
All furniture and other fittings were numbered in the same way, and then, when everybody had gone home, expert removers with a fleet of motor-vans made many journeys between the Strand and Langham Place.

Monday morning found everybody concerned in good humour and early in their new rooms at Broadcasting House, tackling the task of unpacking and getting straight. In most instances the rooms had already been got into ship-shape order by the cleaning staff, and within a few days work was going on more or less normally.

Several departments and sections, including the Director-General's, the Controller's, part of Major Gladstone Murray's, and the whole of the Finance and Music departments' staffs have still to move, but the biggest part of the job is done, and those

(*Continued on page* 202.)

An EKCO Unit will give you trouble-free radio for 1d a month



External and internal views of Model A.C.18. Size 9 × 5 × 3½.

....and finish with batteries for ever.....

Just connect an EKCO Unit in place of your usual battery, plug in to the electric supply and switch on—that's all. No alterations to your set, valves or wiring.

There is an EKCO Unit for every type of battery-operated set or portable. Models A.C.12, A.C.18, A.C.25 and D.C.15/25 supply H.T. only; Models K.12, K.18 and K.25 supply H.T. and also keep your accumulator constantly charged. All at a cost of approximately only a penny a month.

With an EKCO Unit connected in place of your battery you save money and your radio is always at its best because you always have ample power at full voltage.

Prices from 39/6 or by Easy Payments from 3/8 per month.

H.T. Units.

Models A.C.12, A.C.18 and A.C.25 for A.C. Mains give 12, 18 and 25 milliamps respectively, with alternative voltage tappings up to 120/150.

Model D.C.15/25 (for D.C. Mains,) 15 to 25 milliamps.

Combined H.T. and L.T. Charger Units.

Models K.12, K.18 and K.25 for A.C.-Mains give 12, 18 and 25 milliamps respectively, with alternative voltage tappings up to 120/150.

Also charge 2, 4 or 6 volt accumulators at 5 amp.

Consult your radio dealer or post coupon now for full details.

To E. K. COLE, Ltd., Dept. A 8,
Ekco Works, Southend-on-Sea.

Please send me details of Ekco Power Units.

Name.....

Address.....

.....

EKCO
POWER UNITS

MIRROR OF THE B.B.C.

(*Continued from page 200.*)

who remain at Savoy Hill will not all be moved at one time.

Much has still to be done before the twenty odd studios with their waiting and audition rooms are ready for use, but work is proceeding rapidly, and in some future issues I shall have a good deal to say about the progress of the work and about Broadcasting House and what goes on there.

Broadcasting House will not, as some people imagine, accommodate the whole of the B.B.C. staff, even though it will obviate the necessity of renting so many outside premises as was the case up to about six months ago.

Outside Accommodation Still Required.

The big Engineering and Research and Workshop staffs, about seventy in number, under the control of Mr. Kirke and Mr. Dimmock, at Avenue House, Clapham, will remain, because there is no place in the heart of London where tests and experiments, and the manufacture of apparatus for the various Regional transmitting stations and the outside broadcast department can be carried out.

But now I hear that Avenue House is too small for the requirements of the B.B.C. and that there is every likelihood of moving the Engineering Research Department to more suitable premises. Negotiations have been going on for the purchase of a large house, not a long way from Avenue House, for the purpose, and I should not be at all surprised if the deal has gone through by the time these notes appear.

THE LISTENER'S NOTEBOOK

(*Continued from page 188.*)

this country of the pig-rearing industry as a result. One thing is certain, however, viz.—his talk will cause some heart-flutterings in Danish pig-rearing circles.

One thing I like about Mr. Ernest Newman is that he is one of the few broadcasting critics who do really criticise—and this he does relentlessly yet kindly. His recent criticism on the Haydn Bi-centenary celebrations must have found favour with a large number of music-lovers anxious to hear some of the composer's less familiar works. One hopes his remarks reached the ears of those responsible for the arrangement of future celebrations of this nature.

I was particularly interested in what he had to say about the possibilities of the player-piano. True, this instrument wasn't given a fair trial with Mendelssohn's Capricio Brillante, but even with some really pianistic music, as Mr. Newman suggested, I doubt whether Mr. Reginald Reynolds will ever be a serious rival to Christopher Stone, as was predicted by a certain wireless correspondent.

A Busy Thirty Minutes.

What a tremendous amount Dr. John Baker crowded into his thirty minutes! Even to those who do not profess the smallest interest in the blackbird or the house-sparrow, he must have been very entertaining. He seemed to me to possess a most enviable sense of humour. I wished his talk had been longer.

I would urge Mr. Gerald Barry to use his waste-paper basket more, and pay no attention whatever to correspondents who ask him, at this late hour of the day, to explain why people are selling golden sovereigns, and what happens to these sovereigns after they are sold.

Haven't our newspapers already dealt exhaustively with these questions, and isn't the news stale now? As a matter of fact, I thought that the whole of Mr. Barry's talk was just a re-hash of stale newspaper matter.

Talks Deteriorating.

I recently expressed a preference for talks, but please don't imagine that *all* talks meet with my approval. They don't. I think certain of them should never be sent out at all. Mr. G. Lowes Dickinson's talk on "Goethe" illustrates my point. It would be interesting to know what percentage of listeners sat through this particular talk. A mere handful, I guess. How many listeners didn't even begin to listen in? The majority, I'm certain.

If I am right, then is the B.B.C. justified in catering for the mere handful? I say *not*, for the simple reason that this mere handful can find all Mr. Dickinson has to say in their introduction to any good edition of Goethe's "Faust," and they would doubtless all possess such an edition.

Mr. Dickinson's talk smacked too much of the 'Varsity lecture, and it was delivered quite in the manner of the 'Varsity lecturer. The average listener cannot be expected to accept this as entertainment. If it is intended as instruction, then the dry-as-dust manner of the 'Varsity don must be dropped.

TECHNICAL NOTES

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

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

Using a Milliammeter.

I wonder how many readers use a milliammeter for checking over valve currents? It is a very handy instrument, because you can very quickly tell whether the valves are taking their proper currents and whether the grid-bias and screen-grid voltage are having their proper effect.

If you use a milliammeter in the anode circuit of the last valve, you can quite easily know whether overloading is taking place owing to incorrect grid bias being used, such overloading naturally giving rise to distortion. This is perhaps the best known and simplest use for the milliammeter in checking over the receiving circuit, and for this purpose the instrument should be connected between the high-tension supply and the anode circuit of the valve.

When signals are being received you will notice that the instrument will give little erratic kicks; these can be smoothed out, or practically so, by various adjustments to the set.

Too Much Grid Bias.

Too much grid bias generally shows itself by a movement of the needle further across the scale when signals are tuned in. The bias should then be reduced, and the needle will go back to a lower position and will not be so unsteady. If the valve is being overloaded you will notice that the needle will kick very distinctly on stronger notes.

From the above you will see also that if the grid bias is much too low, the needle will tend to return towards the zero position.

Indications of Distortion.

As an indicator of overloading and of the conditions leading to distortion the milliammeter in the anode circuit, as mentioned above, is particularly useful, and it helps you very much in getting the grid bias adjusted to the best value. Quite a good milliammeter can now be obtained very cheaply and it is a very good investment, as not only can it be used in the way indicated above, but also it comes in handy in a variety of other ways, especially if you go in much for the rigging up of experimental circuit layouts.

For one thing the instrument can be used with the detector, in which case it will give indications of the strength of signals. If you are using a grid-leak detector arrangement the reading on the meter will decrease as signals are tuned in. In fact, the high-frequency amplifier can be adjusted and the effect of the various adjustments can be noted by the meter when you would not be able to observe any difference in the output if you relied upon the ear alone.

Useful in Ganged Circuits.

The rectified anode current in the detector circuit will vary according to the screen-grid and grid-bias voltages used, and if a milliammeter is in circuit these effects can be instantly noted. In the same way, when ganging up a set, a meter is particularly useful, as the tuning will, of course, depend upon the ganging, and will at the same time influence the reading of the meter so that the accuracy of the ganging is reflected in the readings on the instrument.

Some instruments have only a single range, whilst others have two or three ranges, these latter being, of course, more useful. Personally, I use a number of different instruments, but this is more expensive, and the multi-range instrument is usually quite satisfactory for most ordinary purposes.

One of my instruments reads up to 30 milliamps on each side of zero, whilst another has a range of 0 to 5 milliamps, and another, which is particularly useful for such purposes as those mentioned above, has a total scale reading from 0 to 2½ milliamps.

Amplification Factor and Impedance.

I said something recently in these Notes about amplification factor and impedance. Many amateurs think that the total magnification which is obtainable should be proportional to the amplification factor of the valve. This is not surprising because, after all, to the average person the phrase "amplification factor" means what it seems to say, and that is, a simple measure of the total amplification obtainable.

The fact is, however, that the magnification depends not simply upon the particular factor defined as the amplification factor, but upon a number of others as well, of which the most important is the impedance. The impedance, in fact, is quite as important as the amplification factor.

Then you might think that if you had two valves of the same impedance but of different amplification factors, the one with the greater amplification factor would give the greatest overall magnification. If the two valves were used alternately in the detector position it is probable that the above would be true, but there are some cases where it would not be true. For instance, in a screen-grid stage, of two valves otherwise equal, but one having a greater amplification factor, the latter would quite possibly give inferior results to the former owing, for instance, to the circuit being rendered unstable.

If instability set in, it would complicate the tuning, and in order to get out of these difficulties you might reduce the screen-grid voltage so as to bring back stability, but then the total amplification might, as I say, be no more than (or even less than) that which you would obtain with the other valve. Not only this, but with a correspondingly reduced grid-bias voltage you might also have overloading and distortion.

Interchanging Valves.

This touches on a question which is very commonly asked, especially by beginners, because you would certainly think that by substituting a valve of greater specified amplification factor for a valve which you were previously using, you ought to get better overall results. What I have said above only goes to show that there are many factors involved in the performance of a valve in any particular conditions, and as a rule, if you have a valve which is really working efficiently, it is better to leave well alone.

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

If you substitute another valve you may start hares running in all directions and give yourself a lot of trouble in getting back to results as good as those you had at first.

Anode-Bend Detection.

Talking about valve impedances, by the way, I dare say you know that when a valve is used for anode-bend detection the impedance of the valve is often greater than the specified value owing, of course, to the different conditions in which it is used. The specified impedance is often taken at zero grid bias at a standard H.T. voltage of, say, 100 volts.

When the valve is used for anode-bend detection it has a negative bias applied, and the result of this is that the working point of the valve is moved towards the lower curved part of the characteristic curve. The impedance nevertheless is, as I say, greater than the specified value, and it is therefore important when considering the use of a particular valve for anode-bend detection to have in mind very carefully the type of coupling which will be used with it.

For instance, a different type of valve will be needed for transformer coupling from that required with resistance-capacity coupling. If a valve has a fairly low impedance transformer-coupling will probably be quite satisfactory, but if the impedance of the valve is high, it may be preferable to use a resistance coupling.

New Accumulators for Old.

When an accumulator has been in use for a fairly long time, say two or three years, it generally begins to shed the paste, and this falls into the "mud space" at the bottom. But sometimes particles of the paste will get wedged between the plates and short-circuit them—or, at any rate, partially short-circuit them—so that the battery soon loses its charge.

I had a lot of trouble recently with a motor-car battery from exactly this cause, and it was only after several "cleanings out" of the battery with distilled water that I succeeded in getting it into proper working order again.

With a radio battery contained in a celluloid case it is a comparatively simple matter to see whether any particles are lodged between the plates, and so far as the mud and fine grains are concerned you can get these out—with a certain amount of trouble—by repeatedly washing out the cell and draining the water through the vent at the top.

A reader, however, sends me a hint which seems to me quite a good one if properly carried out.

Cleaning Out the Cells.

He says that he had a very troublesome accumulator and the only way in which he could get it right was to cut a hole, about half an inch in diameter, in the bottom of the case and then to flush the whole accumulator thoroughly by means of a piece of hosepipe pushed over the top vent, the water flushing between the plates and coming out at the hole at the bottom.

When the cell had been finally freed of all particles between the plates and had

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

then been well rinsed with distilled water, it was stood upside down and wiped and then left until the celluloid was perfectly dry. A circular patch of celluloid sheet about the size of a shilling was then carefully cemented on by means of celluloid cement so as to cover up the hole.

This was left twenty-four hours to make absolutely certain that it was secure, and then the cell was filled up with acid again and put into service.

Repairing the Cell.

This strikes me as quite a good scheme, and the only really vital point is to make sure that the patch is thoroughly cemented over the hole when the cleaning operation is complete. By the way, unless the celluloid in the region of the hole and also the patch are thoroughly dry before commencing operations, you will not succeed in getting a good mend.

Some of you may think that this is rather drastic treatment, but remember that when a cell has got to the stage of shedding its paste freely and getting particles lodged between the plates, it is pretty well on its last legs anyhow, whereas by the above-mentioned dodge, drastic as it may seem you have at any rate the chance of giving the cell another year of more or useful life.

Attention to Details.

The detector is the most vital point of the whole of the receiving circuit, and I think many of us are sometimes apt to overlook this. We do not, I think, always give sufficient care to adjusting the values, grid bias, grid condenser, reaction, and so on, as we might do; extra care in these particulars will well repay the trouble involved.

When you come to think of it, the detector valve in the receiver has quite a good deal to do, as it is handling both high-frequency and low-frequency currents at the same time.

The grid circuit of the detector receives modulated high-frequency signals either direct from the aerial or after amplification by high-frequency stages. In the anode circuit is a low-frequency transformer or some other form of coupling for transmitting the low-frequency signal to the next valve. The anode circuit also carries high-frequency currents.

A Ticklish Stage.

It is clear that if we vary the value of any part for some particular purpose, for example in order to improve quality, we most probably will affect at the same time other factors, such as the strength of the signals, the smoothness of the reaction or what not. The detector stage is, therefore, as I say, not only the most important but probably also the most ticklish of all the stages in the receiver.

Inasmuch as there are so many factors to be considered, the variation of any one of which immediately involves all the rest, you will see how important it is to spend very special care upon the correct adjustment of this stage. The detector stage, in fact, is really doing a multiple and very complicated job, and you mustn't be surprised if it squeals (metaphorically, if not literally) when you ask it to perform impossibilities.

Using a Metal Baseboard.

When making up a set on a metal base, or upon a baseboard covered with a metal sheet, it is pretty obvious that special care must be taken to avoid any short-circuits or accidental contacts. But it is surprising how easy it is to make an accidental contact without knowing it, and really you should take extra special care to examine every component which you fit on to the metal base so as to make sure that there is proper clearance between all the parts.

I have seen a valve holder mounted on a metal base, the holder itself being quite clear, but when the valve was pushed into position the valve pins went right down and one or more of them touched the metal. The terminals fitted in the base of a tuning coil or a choke or transformer may very easily make contact with the metal sheet, and all these parts should be very carefully examined to make sure that terminals are properly countersunk in the components so as to be clear of the metal base.

One way, of course, is to cover the metal sheet with a further sheet of thin plywood or even a thinner sheet of insulating fibre; but although this simplifies the problem a good deal, it still remains to be very careful what you are doing with such a lot of contacts and such a large amount of metal close at hand. Incidentally, it is always a good plan, and particularly in the case mentioned above, to fit a fuse, of the flash-lamp or some other type, and to be sure the fuse has a sufficiently low current rating to be an adequate precaution for the set.

NEXT WEEK

SOME "COSMIC" POINTERS

Television Progress.

Several of the big electrical concerns in the United States either have already, or have applied for, experimental licences for television. I see that television in the home, according to many well-known American engineers, is reckoned to be at least three, if not five years in the future, whilst some even go so far as to put the time when television will be in any sense a useful, practical home entertainment as far as ten years ahead.

The television licences granted by the Radio Commission are on an experimental and temporary basis. This, I understand, is because, whilst the Commission thinks that experiments in television should be encouraged, they do not see their way to grant a permanent licence which would be based upon "public interest, convenience or necessity."

Incidentally, notwithstanding the experimental work which is going on in the United States, I see that Dr. Colpitts, a very well-known American radio engineer, in a public lecture upon probable developments in the radio and electrical field, did not introduce the subject of television. From this it is presumable that he does not regard television as likely to be a practical proposition for a long time ahead.

WHERE YOU CAN SEE "COSMICS" AND "S.T. 300's."

A further List of Retailers who have Registered as Official "P.W." Exhibitors.

LONDON.
"Electrico," 97, George Street, CROYDON.
Polehars (1919), 96-98, High Street, DEPTFORD, S.E.
Radio Supply Stores, 574, Old Kent Road, S.E.1.
Reliance Radio Service, 29, South Street, ISLEWORTH.
Service Electrical & Radio Co., 28, Windmill Hill, Enfield, MIDDLESEX.

ABERDARE.
J. D. Williams, 65, Cardiff Street.

ACCRINGTON.
Frank Edmonds, 17, Abbey Street.
H. A. Sharples, 261, Blackburn Road.

ASHTON-IN-MAKERFIELD.
G. F. Smith, 57, Gerard Street.

AYLESBURY.
E. D. Hasberry, Radio Shop, Temple Street.

BACUP
J. Crawshaw, 149, Market Street.

BEDFORD.
Norman Mickle, 37, Bromham Road.

BIRKENHEAD.
A. Allchin, 370, Borough Road.
Radion Co., 237, Old Chester Road.

BLACKBURN.
H. H. Flintoff, 47 & 53, Copy Nook.
Shapes, Ltd., 55, Penny Street.

BOLTON.
J. Westhead, Esq., 38, Arlington Street, Gt. Lever.

BOSTON.
Allens Radio Service, 6, Emery Lane.

BOURNEMOUTH.
Gardiner's Radio, West Southbourne.

BRADFORD.
H. Atkinson, Barkerend Music Stores, 211A, Barkerend Road.
V. Wilson, Esq., 33, Bowling Old Lane.

BRISTOL.
H. E. Hamilton, 39-40, Bridge Street and 45-51, Church Road, Redfield.

BURNLEY.
T. Duerdon, Westgate.
G. Pye & Son, 131, Padiham Road.

CAMBRIDGE.
A. W. Matthews, 41, Mill Road.

CARDIFF.
J. F. Paull, 43, Caroline Street.
Splott Radio & Gramophone Co., 9, Splott Road.

CONNAH'S QUAY.
George M. Coppack, 80, High Street.

CRAWLEY.
W. H. Hogger, Esq., 4, Post Office Road.

CRIEFF.
Frank Thomson, Esq., 7, 9, 11, East High Street.

DERBY.
J. & C. Wireless, 54, Green Lane.

DEVIZES.
James Bros. (Wiltshire), Ltd.

DEWSBURY.
C. Phillips, 33, Wellington Road.

DOVER.
Albert V. Nutley, 30, London Road.

ELLESMERE PORT.
G. Salter, 56, Station Road.

GORLESTON-ON-SEA.
Gorleston Cycle Depot.
C. W. Williams, 174, High Street.

GRIMSBY.
Abbey Motors, Radio House, Freeman Street.
C. H. Turner & Co., 3, Corporation Road.
W. Westoby, Hutton Road, Fish Docks.

(Continued on next page.)

WHERE YOU CAN SEE "COSMICS" AND "S.T.300's."

(Continued from previous page.)

HANLEY.
M. Pearson, Esq., 76, Lower Mayer Street.

INVERURIE, ABERDEENSHIRE.
The Square Engineering Works, 39a,-40 Market St.

IRELAND.
T. Hastings, Esq., Fair Green, Westport, Co. Mayo.
S. B. Corry, Esq., Market Square, Ramelton, Co. Donegal.

ISLE OF WIGHT.
F. E. Dominey, 20, Shooters Hill, Cowes.
H. W. Millard, Esq., The Corner Radio and Gram. Stores, 25, Clarence Road, East Cowes, I.O.W.

KIDDERMINSTER.
T. F. Hancock, 117, Mill Street.

LEIGHTON BUZZARD.
Frank Griffin, 40, Hockliffe Street.
Griffin Bros., 11, High Street, and 63, North Street.

LIVERPOOL.
H. J. Coxon, 240, County Road.
"Hobbies," 35, Manchester Street.
Morris & Co., 230, Smithdown Road.
Tom Simm, 275, West Derby Road.

LOWESTOFT.
F. J. Hughes, Junction Passage.

MACCLESFIELD.
H. Lucking, 50, Sunderland Street.

MAIDSTONE.
J. W. See & Sons, 12, Earl Street.

MANCHESTER.
E. Butler, 178, Princess Road, Moss Side.
S. Howarth, Esq., Ivy Nook, Lower Crumpsall.
Newton Radio Co., 398, Oldham Road, Newton Heath.

NOTTINGHAM.
World Radio Supply Stores, 78, Radford Boulevard.

PONTYPRIDD.
D. C. Ball, 72, Taff Street.

REDRUTH.
E. Russell, Higher Fore Street.

ROCHESTER.
Clarke & Simmons, 212, High Street.

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W. Gibson, Esq., Radio Co., 34a, Commercial Street.

ST. HELENS.
W. Cawley, Junr., 66, Liverpool Road.
F. Cholerton, 52, Bridge Street.

ST. NEOTS.
Moore & Co., High Street.

SCILLY ISLES.
Alfred Green, The Steval, St. Mary's.

SEAFORTH.
J. Murphy, 13-15, Seaforth Road.

SEVENOAKS.
F. J. Lawrence, Westinghouse, Quakers Hall Lane.

SHEFFIELD.
W. H. Sherwood, 56, West Street.

SIDCUP.
Sidcup Electrical Co., 72, High Street.

SITTINGBOURNE.
E. & C. Landen, 55, High Street.

SMETHWICK.
Lambert Bros., 326, High Street.

SOUTHEND-ON-SEA.
L. V. Bridge, Warrior Square.
London Radio Supplies, 29, Victoria Arcade.

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G. Balance, High Street, LONGTON.
C. Podmore, 47, High Street, LONGTON.

STOWMARKET.
Stannard & Co., Tavern Street.

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Clarke & Simmons, 26, High Street.

SWANSEA.
G. P. Evans, The Square, Brynhyfyrd.
Waldron Electrical Manfg. Co., 6, Portland Street.
Peacocks (Swansea), Ltd., 32-6, Woodfield Street, Morriston.
O.K. Radio & Gramophone Stores, Church Street.
J. Mitchell, 46, Clydach Road, Morriston.
Tom Roberts' Radio Service, 8a, Humphrey Street.
Snell & Sons, 20-6, High Street, Arcade.

TAUNTON.
G. F. Small, 60, Station Road

TROWBRIDGE.
A. R. Farr, 7, Islington.

(More Names Next Week.)

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REGISTERED AT THE G.P.O. AS A NEWSPAPER.

LARGEST RADIO CIRCULATION IN THE WORLD

Popular Wireless

Every Thursday PRICE 3d.

No. 517. Vol. XXI. INCORPORATING "WIRELESS" April 30th, 1932.

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HOW TO MAKE

THE "P.W." "PHONOTRAP"

A very inexpensive gadget which can be used in conjunction with any valve set. It acts as a standby against battery or valve failures, and also cuts out interference from unwanted stations.

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CAPT. P. P. ECKERSLEY

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VARIABLE CONDENSERS

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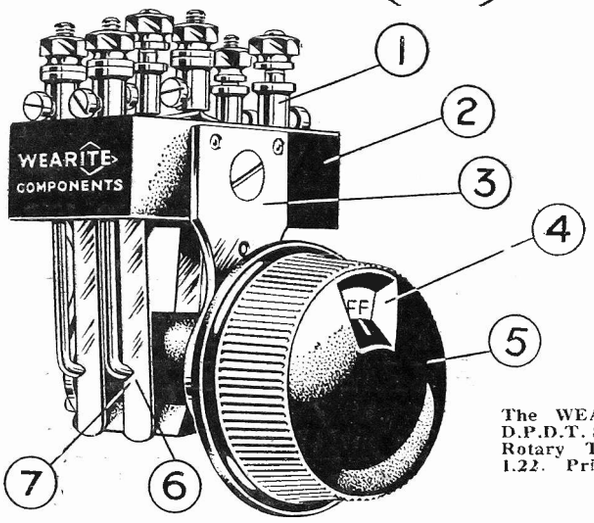

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5. **Large Knob (Black, or otherwise specified.)**
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7. **Self-Cleaning Contacts.**

There is also a miniature pattern of this switch: List Nos. I 31, 32, 33, 34, 35, 36, 38. Prices 3/3 to 5/-.

Ask for Leaflet.

These switches are now fitted with terminals and are complete with window knob, dial and bracket—and are "one-hole" fixing.

	Price.		Price
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The following indicating discs are available—either black lettering on white, or white lettering on black. "Rad-off-Gram," "L-off-S," "Off-On," and also blank white for own marking.

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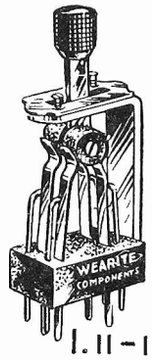

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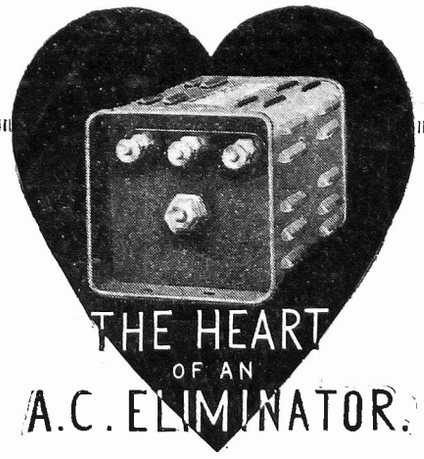

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Long life, high efficiency and freedom from deterioration or breakdown form a combination only possessed by THE

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See that it is incorporated in the A.C. eliminator YOU buy; or, if you prefer to build your own, send for details of our constructors' range. A 3d. stamp will bring you a copy of "The All Metal Way."

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Every set-owner who wants to get the best possible reproduction should get the May number of "Modern Wireless," which contains

A COMPREHENSIVE SURVEY OF LOUDSPEAKERS OF TO-DAY

CONCISE! **COMPLETE!**

THE MAY NUMBER OF

MODERN WIRELESS

provides in one complete supplement a Review of Loudspeaker Technique, a Survey of All Modern Types, and details of The Link Between Set and Speaker—i.e. The Output Circuit.

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A SPECIAL SUPPLEMENT FOR THE LONG-DISTANCE MAN:

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The May "M.W."

Order Now! ***On Sale April 30th—1/-***

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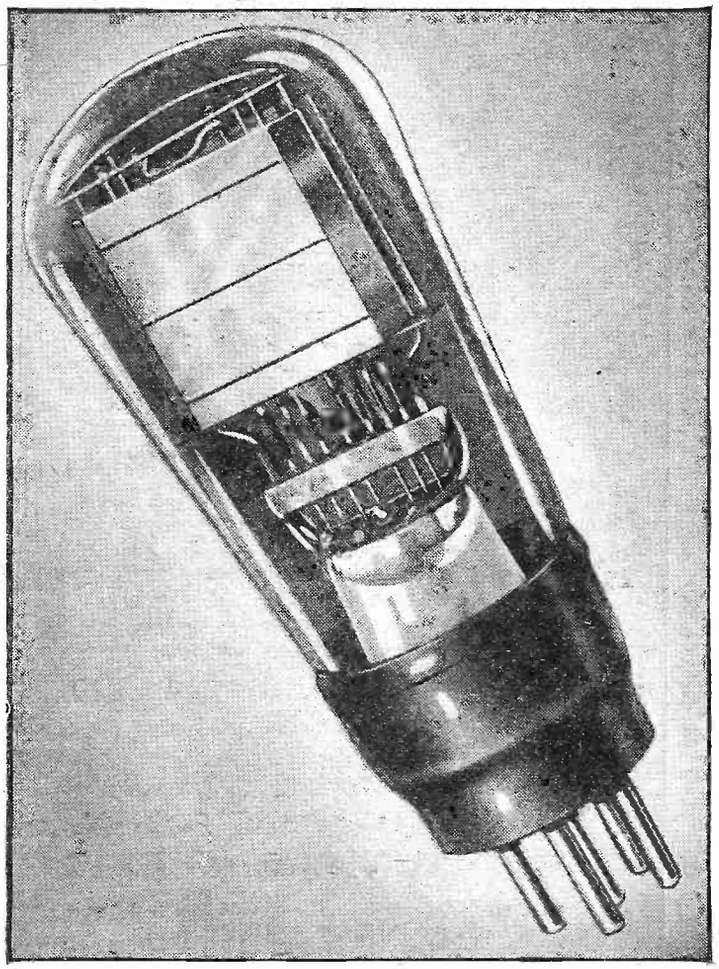

★FOR THE MAN WHO USES BATTERIES

PEN 220

Here is the solution to the output stage problem in battery operated receivers. The Mazda Pen 220 gives an astonishingly high undistorted output for an anode current of only 5 m/a. It is the ideal output valve for portables.

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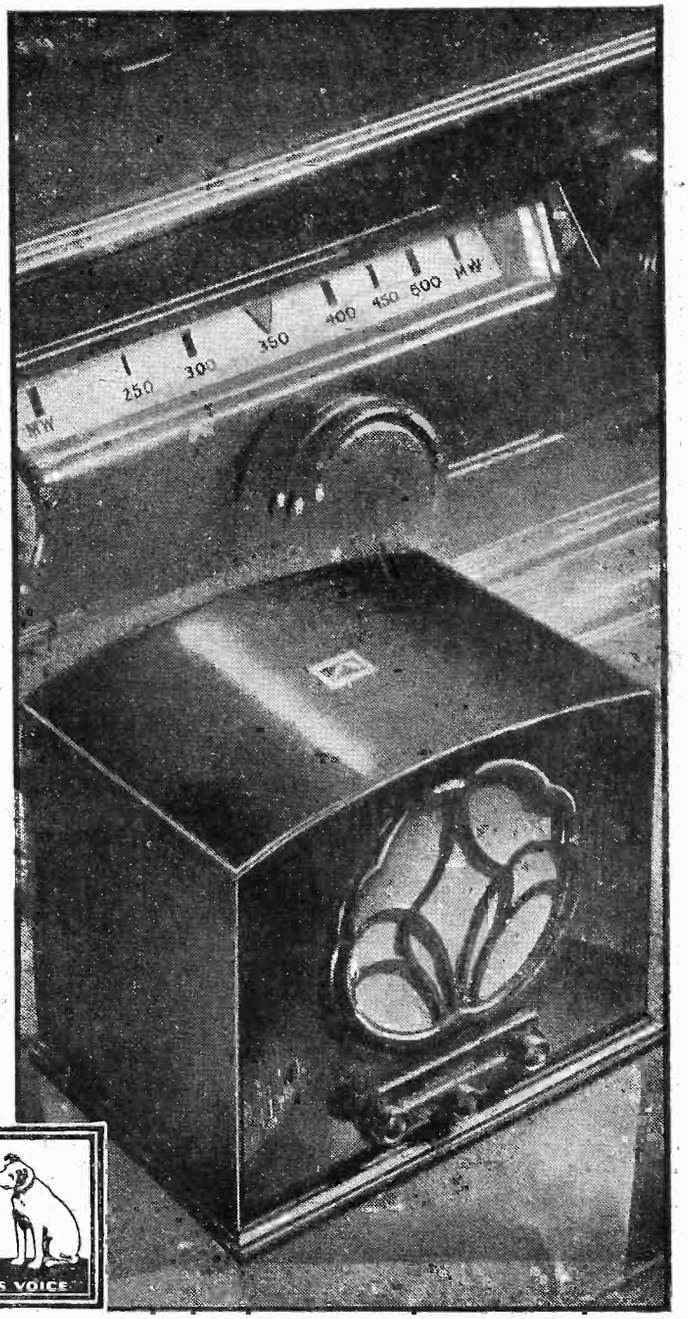
V.147

VOTED BEST—35 MAJORITY

Radio Societies test "His Master's Voice" Radio—Model 435

ON TOP FOR—

SELECTIVITY, TONAL QUALITY ARTISTIC APPEARANCE . . . . ABSENCE OF HUM . . . . . .



THE finest set in its class—for selectivity, for tonal quality, for artistic appearance, for absence of hum. . . . that was the verdict given when "His Master's Voice" Model 435 was put to the test as one of six representative types of receiver at Sunderland recently.

The critics were a joint meeting of the Northern General Transport Company's Radio Club and the Sunderland Lecture and Debating Society. Each set was tested in turn. A vote was taken for the best instrument. *The "His Master's Voice" instrument gained a majority of 35 votes!*

This verdict confirms the opinion of numerous press technical experts who have tested Model 435 and have found it by far the most advanced receiver of its type. "Popular Wireless," for instance, said that "it is, indeed, one of the finest 'Threes' I have tested"—and other experts were equally emphatic in their praise.

You may have this remarkable instrument on approval in your own home, without the slightest obligation. Ask any "His Master's Voice" dealer and he will gladly instal the set and leave it for you to test at your leisure. If you do not know the address of your nearest dealer, just fill in the coupon below.

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 in operation—long waves, medium waves, or the playing of gramophone records from a pick-up. Mains aerial (A.C.). Plugs for additional loudspeaker.*

42/- down

and the remainder in 12 monthly instalments of **33/10**

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His Master's Voice

"TRUE TO LIFE" RADIO

COUPON *The Gramophone Co. Ltd., 363, Oxford Street, London, W.1.*

Please tell me the name of my nearest "His Master's Voice" dealer who will arrange for me to have Model 435 on approval in my own home.

NAME.....

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K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.

A THROW-BACK
"'TIS OF THEE"
CROCHET AERIAL!
SCHOOL RADIO

RADIO NOTES & NEWS

ARIEL V. ARIEL
SOFT ANSWERS
THOSE VANS
PERPETUAL MOTION

Elimination of Interference.

I SUGGEST that the Post Office is to be congratulated on its work during the six months ended February 29th in eliminating interference with radio reception caused by trams, etc. During that period it received 6,230 complaints, and in 4,740 of these instances the trouble was remedied.

By the way, at the Ideal Home Exhibition the Post Office had an excellent demonstration of the methods used for stopping interference from various types of electrical apparatus, and the two receivers used were a G.E.C. radio-gramophone and an R.I. Madrigal.

A Musical Throw-back.

I CONFESS that it caused a thrill of mirth to pulsate through me to read that the B.B.C. is to broadcast soon a 2,000-years'-old hymn addressed to Apollo. This hymn is, I believe, inscribed on a chunk of marble which lives in the British Museum.

I cannot imagine what this will sound like, but in all probability we shall get a Honeggerish, Stravinsky-like sensation. Be that as it may, as all the best writers put the matter, the B.B.C. cannot be robbed of its triumph in announcing "First radio performance in England"!

"My Country, 'Tis of Thee!"

YOU would be greatly surprised if you knew of all the clippings, circulars, reports, etc., through which I plough for these notes.

I was rewarded recently for my pains by finding in a 1931 "Memoria" this stirring passage about broadcasting. (Translation) ". . . thanks to the special attention which the Ministry has lent to this branch, Colombia can pride itself in occupying in this matter the first place among the nations of South America." Well, Colombia boasts *one* national station and *seven* private ones. The Argentine has at least *thirty-eight!*

The Crochet Aerial.

M. L. M. (Penrith), a lady, tells me that in August, 1930, I said, "Women don't originate." I'll accept her word, but would put up this defence: it was in the "silly season."

However, my correspondent has crocheted an aerial, of circular form, with No. 30 D.S.C. wire, and asks whether that is original. It is a pleasingly feminine gesture, probably original, but (pardon, mamzelle!) not particularly useful. She would almost certainly have got the same results on the receiver had she merely hung up the tangled mass of wire.

Never mind! Trim it with pink ribbon; that would be original work on an aerial. Very glad that "P.W." cheered you during your illness. Do tell us some more!

THIS IS A "GRAND" IDEA!

A radio set recently exhibited in London, which takes the outward form of a miniature grand piano.

School Lessons by Radio.

JUST as an example of the lack of contact with reality exhibited by some of those who are trying to make radio lessons part of school routine, I give the following naïve remark by Mr. F. Roscoe, Vice-Chairman of the Council for School Broadcasting. "Good Broadcasting in the schools would give children a standard both of good reception and of good programmes. They would go home and tell their parents, if their own wireless set did not give good reception, 'Do you know that wireless set of ours is no good? We have a much better one in the schools. And that vaudeville and jazz you like is not half as good as the songs and music we get from Sir Walford Davies.'" How pleased the family would be!

Are His Goods "Antiques"?

A DIARIST in a London evening paper quite naturally rejoices at having seen in a small town this sign: "Ye Olde Wireless Shoppe." Discoveries like that keep a man's heart young. But who can divine what subtlety lies behind or within this anachronism?

Is it a trap for American tourists or merely an effort to compete with "Ye Olde Bun Shoppe" opposite? Anyhow, the thing as it stands is perfect; explanations would rob it of its bloom and it would then look as suspicion-worthy as one of the myriad chairs upon which Queen Elizabeth is alleged to have sat.

Radio Spoils the Picture.

THERE is on foot a romantic scheme to sail from Spain to South America in a replica of Columbus's ship, the *Santa Maria*. Unfortunately for the perfection of this plan, it is found that the adventurers are bound by regulations to carry a doctor and a radio installation. No doubt Columbus or his mate would have done such doctoring as was required, so that the compulsory Sawbones (or Pills) does not mar the

(*Continued on next page.*)

CONTINUING ARIEL'S NEWS AND VIEWS

picture noticeably. But the radio set is a tremendous blot and I can suggest only that they should disguise it as an old oaken chest of the period.

"Arie!" Protests Against Ariel.

THE B.B.C.'s new headquarters has been named "Broadcasting House," which is a true but inartistic name. But business is so slack that some people have had time to hold a newspaper correspondence about this unimportant point. I am not perturbed about it; they can call the place "Dirty Dick's" for all I care! But I protest against the wicked suggestion that the building be named "Ariel House"—the outside of it is already plastered with the most libellous carvings which are alleged to represent Ariel!

Soft Answers.

J. P. S. (Glasgow). Thanks for card. Will C. H. B. note that O K N is a commercial station at Podebrady, Czecho slovakia? J.B. (Birmingham). Cutting received. Huge joke by an "expert," but not usable. R.S. (Cheam). What do you mean—*nom de prune?* I was properly named "Ariel" by the "Father of the Chapel" and anointed with American Cackwak—the stuff for which we send greenhorn office boys to the little bun-shop back of St. Bride's! T.L.P. (Norwich). You don't *have* to get a licence to *work* a set. It's electricity you *need!*

Broadcasts Which Didn't.

THE B.B.C., with that lack of guile which so ennobles it, has been good enough to tell us (with chuckles, understood!) about some of the awful things which might have been broadcast had the B.B.C. not stood between us and the enemy.

Item: A gentleman who recited in twenty-nine lingoes. But, I say, a clever chap, well worth roping in. Item: A lady "who fancied herself" on the comb-and-paper. But, I say, just as good as playing on a saw or telling us about obscene novels. Item: Someone who played the piano with her elbows. But, I say, such elbows would be invaluable for rendering Honegger's works!

Personal Note.

WE deeply regret to announce that Mr. James Ward, a founder and director of the well-known and old-established firm of Ward and Goldstone, passed away on April 8th. "P.W." extends its sympathy to the relatives and colleagues of the deceased gentleman.

Queen of the May-Magazines.

UNDOUBTEDLY the "Wireless Constructor," the King being "M.W." Now, this sixpenny Queen, 56 pages of up-to-the-minute radio reading, besides John Scott-Taggart's articles includes a constructional description of a super-heterodyne receiver by Victor King, which will give you all the stations in Europe to play with—separately. There is also a similar article relating to the "Pentode" Two, for thinner walletted folk, and heaps of smaller practical articles relating to your hobby.

Those P.O. Vans.

NOT long ago I ventured to cast some doubt upon the ability of the Post Office "pirate"-hunting vans to detect the presence of receivers in houses.

"SHORT WAVES"

ROWDY.

In the Arctic the atmosphere is so clear that a whisper can be heard a mile away.

It must be awful when two neighbours are trying to get different stations on their wireless sets.—"Sunday Pictorial."

* * *

Nature broadcasts are to be a feature of this year's wireless programmes. We are looking forward keenly to the evening when the Fat Stock prices are interrupted to allow the plaintive cry of the peewit to come through.—"Punch."

* * *

A contemporary thinks that something should be done with the people in the studio who laugh at the jokes made by comedians who broadcast.

What about giving them medals?

* * *

Sir Thomas Purves, Chief P.O. Engineer, recently suggested that credit should be given to the Post Office for curing many Scotsmen of stammering. "For," he said, "since they used the long-distance radio telephone, they have realised that for every fraction of a second lost in stuttering bang goes saxpence."

* * *

A USEFUL HINT.

When a crystal set produces very loud signals, an improvised loudspeaker can be made by placing the headphones in a soup bowl.

Enthusiasts must be sure, however, that the bowl is free of any soup, because the presence of such an element would cause a flood in the magnetic field.

* * *

"There are musical notes which are inaudible to the human ear," says a scientist. There certainly are many which should be, especially on our neighbour's loudspeaker.

It is, therefore, cheering to me to find in a very "live" New York radio magazine an article entitled "British Radio Hoax," in which the whole romance of these vans is very funnily but very acutely described.

However, the main thing is, I suppose, that the bluff worked. When a Government department begins to exhibit signs of imagination it is time for the public to wake up and scratch itself!

Variety in Advertising.

MUCH as I revere the makers of modern advertisements—and I mean, in particular, radio advertisements—I think that they are rather prone to move in masses. Waves of tobacco pipes adorn galaxies of strong faces; then sheaves of cigarettes appear, held gracefully in explanatory fingers—and so on.

I wish they would break away from mugs and pipes, fingers and fags, and introduce more variety. What about "Mr. Burfee, of Burfees, Ltd., shaking hands with a Louth clear-starcher named Grasspit"? Or "Mr. Bunsnap, designer of the 'Bunsnap Push-and-come-again Three,' with his collection of hotel spoons." What a "pull" such pictures would have!

Attack on Water Pipes.

I GATHER, in a general sort of way, from the press, that there is to be an attack on the use of waterpipes as "earths." The idea seems to be that we cause electrolytic action by using the pipes as "earths," and thus the aforementioned pipes deteriorate. 'Ow 'orrible! However, I advise you not to worry.

There are more ways of bumping off a cat than giving it a bat in the peeper with a burnt stick, and I think that "P.W." will be able to advise all de-piped readers how to get an "earth." A fat lot of electrolytic action could be caused by the currents passing to earth via a radio receiver!

Perpetual Motion at Last.

THAT, in a general way, is a fair description of the new and wonderful "bakelite" moulding presses which E. K. Cole, Ltd., is installing in a new factory which will employ many extra hands this season. Bakelite mouldings seem to be destined for a great future, and Ekco's are the pioneers of large-scale mouldings in this country.

Think of 1,000-ton hydraulic, high-speed presses, each 35 feet high and 100 tons in weight; think of three of these on 13½ feet deep foundations, working 24 hours per day and using 5,000 units of electricity per day, and you will get some idea of the Ekco reaction to Dismal Jimmy and Trade Depression. I should like the history of this British firm to be told all over the world.

"City of Dreadful Night!"

WHAT a dreadful background of sleepless nights seems to be associated with this story! Some time since, a certain part of Cardiff was being annoyed by "oscillation," and it appears that someone who had been struck by American gangsters' methods offered to put an end to the nuisance—for a certain fee. History is silent as to the response save for one instance, that of a letter to a local paper to the effect that if the "gangster" would come along one night and stop the dogs "oscillating" he would easily earn his fee!

ARIEL.

THESE RADIO COMPONENTS

A COMPLETE AND CRITICAL REVIEW

THE first variable condenser I ever owned cost me £8. It was a magnificent affair, with vanes milled from the solid. It had ball bearings and a vane-distance adjustment. Even then the plates were known to short!

To-day the variable condenser costs only a few shillings, it seldom shorts, and its movement is smooth and easily controllable for fine adjustment. Our thanks and congratulations to condenser designers and makers!

But there still remains a great deal to be done, more particularly when the units of a variable condenser are ganged together on the same spindle.

There is, in fact, nothing very much to say about the single unit variable condenser. It is such a standard article, and its use and abuse is so well known as hardly to merit comment.

A Personal Prejudice.

I have, however, a personal prejudice. I like to grip hold of a handle and turn the blooming thing. I hate scratching about with my finger-nails on the rough surface of the periphery of the adjustment wheel. I like those slow-motion knobs very much. I do not think it a fundamental disadvantage that one cannot sweep quickly through the range.

Of course, ideally, one has a robust handle which one can honestly catch hold of and sweep, in a turn of the fingers, through the whole condenser range while, if one is pulling in that far, far distant station lost in a deep hole between the jagged edges of two powerful jammers, one has a smooth vernier, which can be whisked round for an infinitesimal scale movement.

I need hardly say, finally, that scales must be attached to the spindle of the condenser directly, not to a handle which has an indirect connection to that spindle.

So I turn to ganged condensers because here the discriminating buyer needs to exercise discretion.

First and foremost, supposing one unit of a two-unit ganged condenser was ½ per cent different from another at a wavelength adjustment of 300 metres, and equal to the other unit at 500 metres. Then the two circuits would be exactly in tune at 500 metres, but about 5,000 cycles out of tune at 300 metres. This is a very considerable error, an error which makes its influence more and more felt as one goes down to shorter and shorter waves.

We are still dealing with high-frequency circuits. We have dealt with coils. We showed that coils have to be well-made and wound, not on "Muckite," but good ebonite or paxolin; we showed that unscreened coils ought to be big, that we could judge the efficiency of small coils by looking at the figures representing their dynamic impedance. Now for the condenser.
P. P. E.

One of the fundamental disadvantages of "band-pass" is that a ½ per cent error makes a profound difference to the response curve. For instance, with a capacity coupled circuit this ½ per cent error might mean that the two humps of the band-pass response curve would, instead of just spreading the curve over the local station, actually give full tuning to two distant stations, and include the one you wanted, too!

The question remains, "Can condenser manufacturers guarantee absolute matching of condensers?" I do not think they can.

The Use of "Trimmers."

Of course, inductances are never exactly the same, so the condenser manufacturer gives us "trimmers." These trimmers exist merely to compensate for lack of matching of inductances, but they do not ensure that, as the spindle is turned, each condenser element will retain an exact equivalence with its neighbour or neighbours. Thus, a good idea is to make one of the elements so that it has slits in the vanes and a pair of pliers can move these slits this way or that to ensure matching over the full range of adjustment. Even then does the condenser stay put to within one-tenth of one per cent? I doubt it.

But these are the things which help.

(*a*) *Very robust construction.* Obviously the stronger the whole device the better. Flimsy and unsound mechanical practice means variation with use and with temperature change.

(*b*) *Compactness.* A long spindle, for example, gives mechanical hysteresis. You turn one way towards a setting and the condenser remote from the handle lags behind the ones nearer. When you set one in tune the other is not in tune. But turning back leaves the far-away condenser more in tune, the others less. This can be observed. A badly-designed condenser shaft actually twists and flexes, giving quite incoherent results.

Difficulty in Matching.

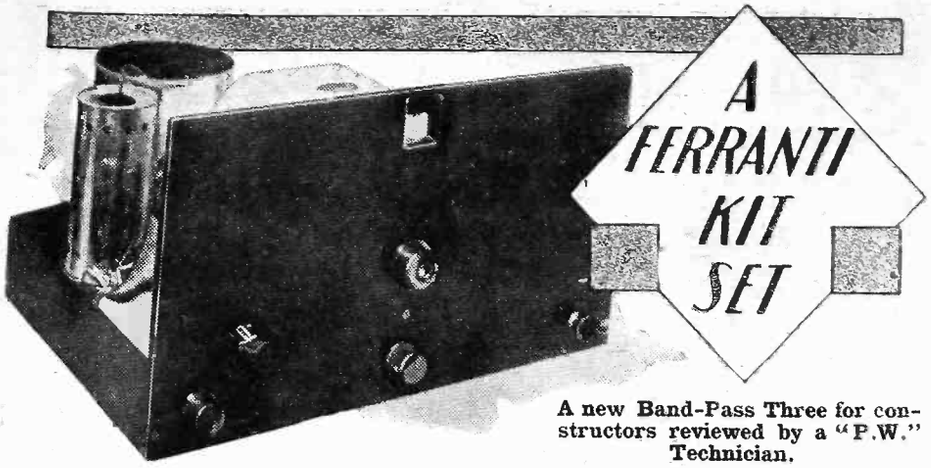
(*c*) *Smoothness of Movement.* Obviously, if the units are inclined to stick they will never function properly.

I doubt if absolute matching, even if once obtained, continues during the life of the condenser. With band-pass arrangements this is fatal to accurate tuning. But if you do not gang band-pass circuits you get into such a mess with tuning as to render the scheme impracticable. Ganged band-pass is perfect in theory, it may be made to work; in practice, I doubt its ability (because most ganged condensers vary) to stay put.

With cascade peak tuning this mismatching of condenser units is not so important. Things average out if you have enough circuits. This is where American practice is so good.

Of course, the Extenser condenser is a first-class device because it does away with the long-short switch. But all that I have said about condensers applies to the Extenser as to any other condenser.

In conclusion, the real importance of the ganged condenser is in its robustness and its ability to stay put. As the mechanical problems are acute the sensible receiving-set designer knows he cannot get theoretically perfect matching, so he uses three or four units of a condenser with peak tuning and knows that a little mismatching doesn't matter!



A new Band-Pass Three for constructors reviewed by a "P.W." Technician.

WE have recently received from Messrs. Ferranti Ltd. of Hollinwood, one of their new battery-operated Band-Pass Three kit sets for test. The completed receiver is illustrated in the accompanying photographs, and it is certainly a break-away in commercial kit set design.

The circuit is a three-valve combination of a screened-grid H.F. amplifier, a "grid" detector, and a single-stage of L.F. amplification, and it has several interesting features. As its name would suggest, full use is made of band-pass tuning, this being of the capacity-coupled type for medium waves, and a mixture of capacity and inductive coupling for the longer waveband. The two "band-pass" coils are tuned by two sections of a triple-gang condenser, which is totally screened.

Volume-control Aerial Condenser.

The actual aerial circuit is not tuned, but is coupled to the first "band-pass" circuit through a variable condenser and a small aperiodic winding. The variable condenser is intended to serve as a volume control, and although it is bound to throw out the balance of the circuits to a certain degree, it does not do so to any great extent.

The next point of interest is the method of obtaining the correct voltage on the screen of the S.G. valve. This takes the form of a potentiometer arrangement, with the "screen" tapping taken off at an intermediate point, so that it gets the right proportion of the voltage applied to the valve's anode.

This is an extremely useful scheme, as it enables a common H.T. tapping to be used for all the valves. There are, however, three H.T. positive terminals provided at the rear of the set, but in actual practice these are generally all joined together.

The coupling for the S.G. valve is by H.F. transformer, the secondary winding of this component being tuned by the third, and remaining section of the triple-gang condenser.

Quality is Above Reproach.

Now, regarding the L.F. end of the set; Messrs. Ferranti here use one of their famous A.F.8 transformers. And, as would be expected, the quality of reproduction obtained from the set, when coupled to a high-class moving-coil loudspeaker, is above reproach.

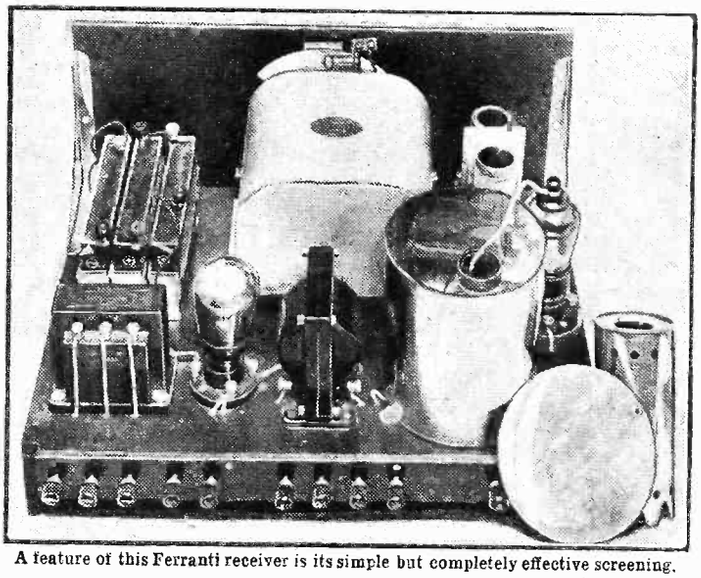
So as to make the set suitable to all types of loudspeakers, a double ratio output transformer is included in the anode circuit of the last valve, the ratios being 1 to 1, and 15 to 1. This is very handy, as it suits either the ordinary high-resistance loudspeaker or the low-resistance moving-coil type.

The set which was sent to us for test arrived already assembled and ready for use, but on looking it over we are convinced that it is a simple set to build. The "two-storey" principle is used in the construction. The baseboard, which is of wood, being raised a couple of inches or so above the lower edge of the panel.

A Wooden Panel is Used.

This latter, by the way, is also made of wood, but it is very nicely polished and gives the set a splendid appearance. All the smaller components are accommodated on the under side of the baseboard, while all the larger parts occupy the "upper deck."

A "THREE-GANG" IN ONE "CAN"



A feature of this Ferranti receiver is its simple but completely effective screening.

The set is well screened throughout, the three-gang condenser being contained in one large "can," the tuned grid coil and the detector valve are enclosed in another metal box, and the S.G. valve also has a metal cover.

An Easy Set to Handle.

The controls are perfectly straightforward, and it is an easy set to handle. The main tuning control is situated in the centre of the panel, and operates the triple-gang condenser. Immediately below it is the reaction knob, both these controls being clearly visible in the photographs.

On the extreme left of panel you can see two more knobs. The upper one, which also happens to be the smaller of the two, controls the wave-change switch, while right underneath it, and in line with the reaction knob is the volume control.

The only other thing on the panel is the on-off switch, which is located on the extreme right. The dial, by the way, is illuminated from behind by a small 2½-volt flash-lamp bulb.

Before going on to the actual test report, there is one other point that should be mentioned, and this concerns the valves. The makers of the kit point out that it is essential to use the exact types specified, if the best results are to be obtained.

Good Daylight Reception.

The particular valves fitted in the model at our disposal were as follows: A Cossor S.G.220 in the H.F. stage, followed by a Mullard P.M.1,H.L. as detector, and a Marconi P.240 (Super-Power) in the output valve-holder. Now for the results.

The set was tried out at a distance of about nine miles from the Brookmans Twins, on a fairly good outside aerial, about 70 feet long and 30 feet high. The test was first made in broad daylight and with remarkable results.

On the long-wave band all the stations of note were easily tuned in at really good loudspeaker volume. The selectivity was fair, but slight interference was experienced when listening to Konigswusterhausen. There being a background of both Daventry and Radio Paris.

This latter station came through at particularly good volume, there being no possible doubt as to its programme value. The same remarks apply also to that popular Dutch station Huizen, which was very nearly as loud as our Paris friend and from which an entertaining programme, free from interference, can always be expected. It comes in quite near to the top of the dial.

Turning to the medium waveband, the daylight results were well above the average and for a straight "three" the selectivity was first-class. No useful purpose would be served by giving a complete list of the stations received after dark; nearly every station in Europe seemed to be waiting to come in, and the Band-Pass Three gave a surprising number at full loud-speaker strength.

An A.C. Model.

The price of the kit is £8 17s., complete with cabinet but less valves and batteries.

There is also an A.C. model available, and this is listed at £12 13s. 6d., without valves.

Messrs. Ferranti cordially invite all those readers who are interested in either of these sets, to write to them for the special pamphlets dealing with these two receivers—don't forget to enclose 1½d. for postage.

HOW WIRELESS WOULD HAVE ALTERED HISTORY

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

No. 3—NAPOLEON.

What would have happened had radio existed in the days of Nelson and Napoleon? Many important battles would have been reversed, and there is little doubt that history would have been changed completely if rapid means of communication had then been available.

AT the beginning of the year 1798 Britain found herself hard pressed in war with three strong naval Powers—France, Holland and Spain. She was holding her own, for during the long-drawn-out five years' struggle with varying fortunes, some useful naval victories had been won, and our allies on the Continent were fighting hard in the field.

But an almost unknown French general, Napoleon Bonaparte, was about to appear in the field of battle, over-run Europe, be made Emperor of the French, and shake civilisation to its foundations.

Trouble in the Mediterranean.

Yet he was nearly thwarted by a sea-commander, Nelson. And, if some system of long-distance signalling had been in existence, such as wireless, Napoleon might have been killed or captured at sea, the French revolution might have collapsed, the Code-Napoleon of Laws never have been written, and much loss of blood and treasure avoided. If Napoleon had been caught at sea, as he might have been if wireless had been invented, the history of the world in the nineteenth century would have been quite different.

During the year 1797 the British had been forced to abandon the Mediterranean. Hardly a frigate flying the British flag had ventured through the Straits of Gibraltar. But it was known that trouble was brewing in that inland sea.

Troops and troopships were being gathered at Toulon, the great French naval base in the South of France. The nearest British force was in the Tagus, in friendly Portugal, under the command of stern old Admiral Lord St. Vincent. On April 29th a 74-gun ship, the Vanguard, joined him.

Blockade of Toulon.

She had as her commander Rear-Admiral Nelson, who had already made a name for himself as a daring seaman. Here was just the man St. Vincent had been waiting for. Giving Nelson two more 74's and two frigates, he sent him to reconnoitre Toulon and find out what was afoot.

Nelson was delighted at the chance. He sailed straight for Toulon and, close off the port, captured a small French man-of-war.

The prisoners let fall the information that in Toulon were 15 ships of the line, four others fitting out, and an army of 36,000, the destination of which no one knew. But a certain General Bonaparte was in command of the whole expedition. Nelson smelt trouble.

But his only means of informing his Commander-in-Chief was to send a small sailing-ship with the news. On land, in those days, an army could not hide its movements for long. Rumours of invasion and battles spread almost as fast as the wireless can carry news to-day. But once a fleet had got to sea and disappeared "into the blue," it was only a matter of chance if it was heard of again until it had descended on to its objective.

NAPOLEON BONAPARTE

The young Corsican officer who rose to be Emperor of France and became Dictator of Europe.

Maritime Blind Man's Buff.

Nelson could only hang about and await developments. And then on May 20th his little squadron was overtaken by a furious gale. His own ship was dismasted and nearly wrecked on the rocky shores of Sardinia. Reaching shelter, the damage was repaired, and now Nelson was joined by Captain Troubridge with 11 more ships of the line. The combined squadron at once returned to Toulon.

The birds had flown. There were various rumours as to the destination—Naples, Sicily, Portugal, Ireland. But Nelson, with his marvellous intuition, formed the opinion that the expedition was bound for Egypt, with the object of eventually attacking our Indian Empire.

On the 14th June he heard that the French had been sighted *ten days before* off Sicily—13 sail of the line, 4 frigates, 200 transports, 36,000 troops, nine generals of divisions, and Bonaparte himself.

It would have been impossible, if wireless had been in use, for this huge force to have evaded battle with Nelson and his fleet. On June 20th Nelson heard at Messina that Bonaparte had taken Malta by assault, and two days later had sailed from that island for the south-east.

"The Fog of War."

Sailing in chase, Nelson, with his fleet, passed within a few miles of the whole French force in foggy weather; each belligerent was unaware of the presence of the other. If Nelson had had a wireless signal from Malta that the French were attacking—as the cruiser "Sydney" heard by a wireless message from Cocos Island in the Great War that the "Emden" was approaching that island—he could have fallen upon Bonaparte and his fleet and army, have routed them, and probably captured the future dictator of Europe.

(*Continued on next page.*)

HOW WIRELESS WOULD HAVE ALTERED HISTORY

(Continued from previous page.)

But it was not to be. Nelson sailed straight for Alexandria and Egypt. It was the only way he could get news. He reached it six days later, of course before the French with their slow-moving troopships, and found the harbour empty. What was he to do? There was no means of signalling to England, or to Lord St. Vincent in the Tagus. The "fog of war" enveloped everything!

"A Famous Victory."

The British squadron zigzagged back to Sicily, eagerly scanning the horizon for their enemy. On July 25th, after filling up with water and fresh provisions at Syracuse, Nelson led his fleet once more to the eastward. He had nearly made up his mind to return to England in case Bonaparte, by a trick had headed for the British coasts or for Ireland.

But he determined to search once more to the East. Near Matapan he learned that *four weeks earlier* the great French Fleet and army had been seen off Crete steering south-east. Once more he headed for Alexandria. And on the 1st August, 1798, one of his scouting frigates signalled clumsily with flags "16 sail in Aboukir Bay."

Just one month before, two days after he had left it in puzzled despair, the French had arrived at Alexandria and had landed their general and his army. Followed the Battle of the Nile and a great victory for the British army.

Deprived of his fleet and the means for receiving reinforcements and supplies, Bonaparte, despite victories in Egypt and Syria, left his army to its fate and slipped back to France in a frigate, there to seize power as First Consul. Bonaparte never forgave the English; and when Europe lay at his feet five years later, he began the preparations for a great invasion of these shores which was to humble the last of his foes.

Napoleon's Zenith.

The events of the intervening years need not detain us for long. They were occupied in the tremendous campaigns on land and the development of French military power, which raised Bonaparte to a height of military power only equalled in the past by Alexander the Great and Genghis Khan, the terrible ruler of the Tartar invaders of the Middle Ages.

In the process he decimated the population of France, bled her people white, ruined a Continent. He compelled England to impoverish herself to subsidise her allies, and to maintain her army and fleet. And still more blood was to flow and devastation to be spread before the military might of the Napoleonic system was shattered.

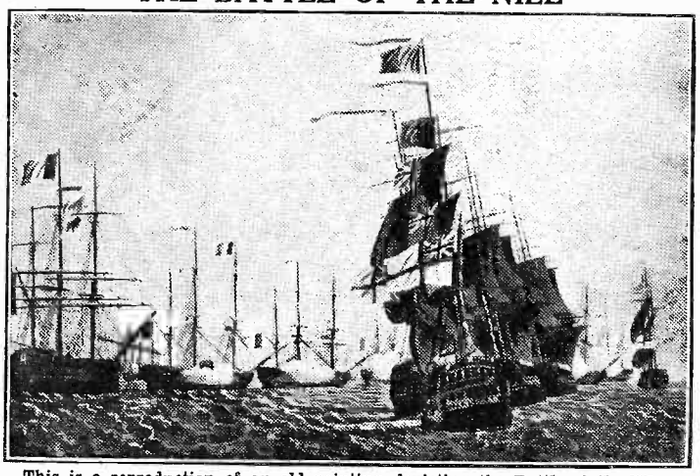
Yet, if there had been a quicker and surer method of sending long-distance messages, of transmitting news, Bonaparte would have had his military career of conquest cut short by capture, and peace would have come many years earlier.

The Fatal Feud.

The old feud between France and Germany was deepened and embittered by these events. It led to the war of 1870 between France and Prussia, and new enmities. And from these enmities grew the quarrel between the two rival groups of powers, the one headed by France, the other by Germany, the rivalry and competition in armaments that culminated in the far more devastating war of 1914–1918, from which the world has not yet recovered.

If only wireless had been at the disposal of Admiral Nelson in 1798, the whole of the history of the next hundred years would have been entirely different.

THE BATTLE OF THE NILE



This is a reproduction of an old painting, depicting the Battle of the Nile, with Nelson's ship "Vanguard" in the foreground.

THE PRINCIPLES OF TELEVISION

A New Book.

THE first books on television were bought eagerly, but were usually discarded rather gladly when the readers found them to be optimistic forecasts rather than practical surveys. Now, however, we have a treatise on first principles, by A. Dinsdale, M.I.R.E., which is both interesting and informative.

It is called "First Principles of Television," and is published by Chapman and Hall at 12s. 6d. There are nearly 250 pages, about 40 photographs, and a great many sketches of apparatus with curves and diagrams to explain the various methods and systems.

A Clear Exposition.

The author succeeds in making the subject thoroughly interesting, and his painstaking review of the optical questions involved is so well done that the essential particulars of the various television systems are clearly conveyed to even the non-technical reader. Moreover, his facts—and he is great on getting at the facts—are so clearly and logically presented that the author gets over a clear picture of the different lines on which various experimenters have worked and are working.

Will Amateurs Do It?

Mr. Dinsdale is so evidently a master of his subject that particular interest attaches to his conclusions concerning the possibilities of television as an entertainment medium of the future. He does not minimise the difficulties—like so many of his predecessors did—and he thinks that just as amateurs made a large number of important contributions to the development of the radio art, so they may yet contribute to the development of television.

Any amateur with ambitions in this direction will certainly find "First Principles of Television" an admirable guide to the subject.

MOYDRUM CALLING!

Some details of the Irish Free State's new high-power station.

From Our Correspondent.

I AM officially informed that the Irish Free State's new high-power broadcasting station is expected to be opened for service early in the autumn. Building work is now in progress on the site at Moydrum, near Athlone, which is almost exactly in the centre of the Emerald Isle.

With its power of 80 kilowatts (Geneva rating), the station should give excellent service throughout Ireland, and it is expected that the signal strength will be considerable in England and Wales. In Western parts of England and in Wales this station should be one of the strongest transmissions, as it will be nearer to listeners in these districts than any Continental station.

Easily Heard in Britain.

The new Irish station will operate on a wave-length of 413 metres. The Dublin transmitter, which is at present using this wave-length, will be closed down, but of course the main studios will still be located in Dublin.

It is expected that the Cork transmitter will also be dismantled.

The greater part of the plant is ready for delivery by the Marconi Company as soon as the building work is sufficiently advanced for the installation of the apparatus to commence. The erection of the masts will be commenced shortly.

This addition to Europe's high-power stations will be particularly interesting on account of the intention to broadcast sponsored programmes. The station, like the present Dublin station, will be under direct control of the Department of Post and Telegraphs and the studios, as at present, will be at the General Post Office, Dublin.

Some "Cosmic" Pointers

Concerning a "Cosmic" which improved with age and a few notes on the subject of station "logs." It is interesting to note that since this article was written it has been reported that an enthusiast has received no less than 140 stations on his "Cosmic Three."

WE have had a "Cosmic" query which, at first sight, would seem to constitute fulsome flattery rather than a request for enlightenment on a radio problem. Here it is:

"A few weeks ago I built your 'P.W.' 'Cosmic' Three receiver, and right from the start I was able to get fine results, and have no complaints at all to make, for it is undoubtedly a magnificent receiver. But I am puzzled by the fact that it has steadily grown even better. It started fine and I could pick up programmes on all three wave-bands with ease, but day by day the set seems to grow more powerful. Surely this is not what one should expect to happen and I am wondering if 'P.W.' can suggest the reason."

You might be forgiven for thinking that our correspondent, who lives in Bradford, is finding his "Cosmic" growing "better and better every day," for the simple reason that he is acquiring operating skill, and is thus able to squeeze more and more out of his set; and that, to some extent, is no doubt what is happening.

Not Due to Conditions.

But it cannot be due only to that, for he is insistent in later parts of his letter that certain stations come in with ever-increasing strength, and these are stations which are receivable without going so close to the edge of oscillation that they are fit subjects for knob-twiddling tests.

Again, it occurs to one that other conditions may have something to do with it, but he negatives that by bringing in his neighbour (who is also a "P.W." fan) who affirms that on *his* receiver, which is not a "Cosmic," reception conditions have not fluctuated within the period in question.

It is certainly an interesting problem and is a variation from normality of the kind we, and obviously our correspondent too, have no fault to find with!

But, of course, there is a reason for it—as sets do not, of themselves, "run in" like petrol engines.

It is probably due to the H.T. battery running down. We know that sounds all wrong, but we believe the answer lies there, all the same.

So much has been spoken and written about the advisability of "plenty of H.T." that many constructors no doubt find it hard to believe that better results can, in cases, be obtained by dropping the H.T. below normal standards.

But this applies to the detector valve; L.F. amplifiers always thrive on "plenty of H.T." providing the grid bias is right.

As we have said before, 40 volts H.T. may please the detector more than 80 or even 60, especially on a three-band set of the nature of the "Cosmic."

Now, supposing our Bradford friend had the detector H.T. plug of his "Cosmic" inserted in, say, a 60 socket of his H.T. battery, it is conceivable that the running-down of the H.T. battery might bring the detector volts nearer and nearer to the best value for easy and smooth reaction and greatest sensitivity.

It is true that the L.F. valves would tend to get less and less H.T. too, and that this would militate against them operating at the top of their form. Inevitably serious distortion and a drop in volume would in due course result.

But you can drop 10 or even 20 L.F. H.T. volts before audibly upsetting the performance of a set so long as you start with an H.T. that gives the margin that always should exist against inevitable battery decay.

More and More Stations.

Readers may say why did we not write to this querist, tell him all the above, and advise him to doubt the virility of his H.T. battery—and then, and not until then, present the full facts of the case.

We should have done so, but our correspondent, like so many others, did not provide his full address. But he will almost certainly read this article, so we may hope to hear from him again in due course.

Another correspondent—and this one *did* give his address—throws serious doubts on the possibility of anyone being able to tune in sixty stations on the "Cosmic" Three receiver—half the number we ventured as a possible "ceiling" for the set.

Rather fantastic (we've used the word before in the same connection!) even talking about sixty stations on a simple detector 2 L.F. set, isn't it?

And yet the present "Cosmic" record is a log of *identified* stations exceeding *seventy* in number. Most of you will remember that a letter from the holder of this record, together with his full name and address, recently appeared in "P.W."

There are no valid reasons why his feat should remain a record for any length of time; and perhaps by the time these words appear in print someone will have gone one, or even a score, better! *

Don't let any new reader jump to the conclusion that the above seventy stations were bagged largely on the short waves; in actual fact, some sixty or so were medium and long-wavers.

This makes it pretty certain that this correspondent will himself pile up a good many more stations if he has the time and the inclination to adventure more on the high frequencies.

A "P.W." Record.

By the way, the number of appreciative letters regarding the "Cosmic" that we have received in itself constitutes a record for a "P.W." set, as also does the remarkably small number of querists in difficulties.

And it should be remembered that we did not invite readers to communicate their results to us. We refrained from so doing for the simple reason that we were confident we had the goods to deliver and that there would be no need whatever to solicit appreciations.

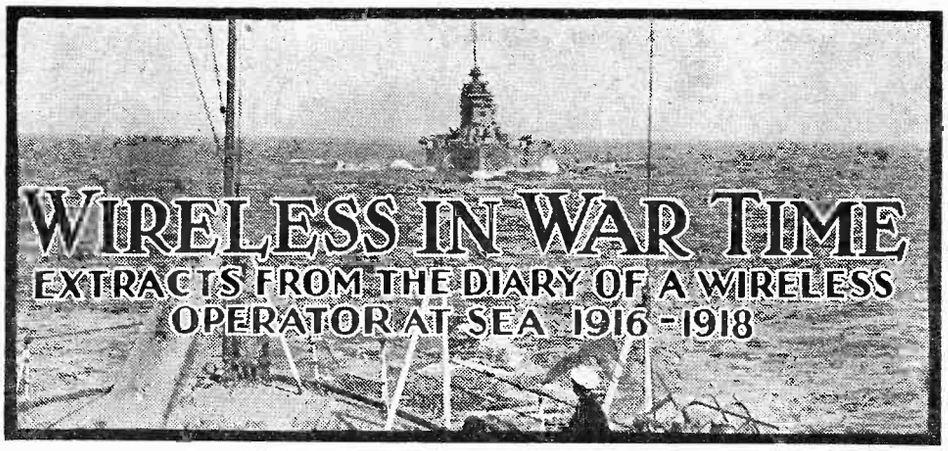
Nevertheless, we must hasten to add that we are always delighted to hear how our readers get on with our sets—though, if they do not feel we have given them anything worth writing about, we can hardly blame them for scanty postbags! G.V.D.

* These words had barely been set up in type before that seventy had been well and truly beaten. First of all we had Mr. Lucy with his eighty, and details of this first appeared concurrently with the letter from the "seventy" man.

But both were entirely eclipsed by a performance recorded in a further letter—140 stations!

We must now be approaching the record for *any* set of *any* type! It remains to be seen whether 140 represents a record for the "Cosmic" which is destined to stand for any length of time.

Personally, we have quite serious doubts about it!



DECEMBER 9TH, 1916.—Have just received news from Cape Race that the German cruiser was last seen in latitude 48°34 north, longitude 27°37 west. Luckily she is rapidly increasing the distance between us. The Captain is relieved. It is very foggy, and is drizzling intermittently. We are due at Halifax either Monday night or Tuesday morning.

DECEMBER 10TH.—Picked up news from Sable Island. Signals are so loud that I can hang the 'phones on the cabin wall and hear them yards away. Cape Race only thirty miles away.

A Mysterious Disappearance.

DECEMBER 11TH.—Started to freeze hard this morning. Old T—— says he will get a job as a window-cleaner rather than come to sea again. Sighted the shores of Nova Scotia at dinner-time to-day. Everybody is in good spirits now, especially old T——, who is dreaming ecstatically of other kinds of spirits.

The chief engineer was telling more yarns at dinner. One was about an Arab who was shipped as a stoker on a boat on which the rest of the stokers were Hindoos. These fellows evidently objected to the Arab's caste. Anyway, one day he mysteriously disappeared.

A search was organised, but at last the chief engineer came to the conclusion that the man had fallen overboard. He was mistaken, however, for when they cleaned the furnaces out, they found the remains of the Arab!

Twice the chief engineer has seen Chinamen throw themselves overboard. Sometimes the stokehole life drives them mad.

Halifax and Norfolk, Va.

DECEMBER 12TH.—Sighted the harbour lights of Halifax at four this morning. Directly we dropped anchor a doctor came aboard, also a Canadian soldier, who sealed up the wireless cabin. The "Olympic" is in dock here, having been chased by the German raider. She doesn't seem in a hurry to leave, either!

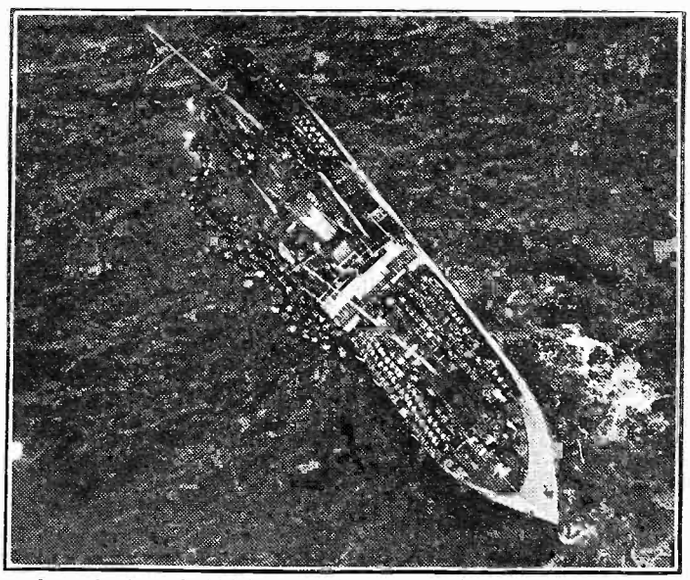
I hear we are going to call in at Norfolk, Virginia, for coal, and then straight on to Port Arthur, Texas. There is a rumour that there has been something like a revolt in London owing to the change in Government; also, that Germany has offered peace terms. There has not been a public-house open in Halifax for twelve months—which proved a staggering blow to old T——.

DECEMBER 15TH.—Woke up to-day to find the mercury 7 below freezing, and ice everywhere. Halifax is not an ideal place to stay in long, but I enjoyed stretching my legs in a brisk walk ashore. The main street, although it boasts of tramcars and banks, etc., is not half as good as Dorking High Street, which it resembles in a way. Heard that two destroyers attached to this port were sunk with all hands last night outside the boom.

DECEMBER 16TH.—8.15 a.m. We were out for boat-drill just now and someone pointed out a piece of ice, or what appeared to be a piece of ice. As it came nearer, however, we saw it was a ship's lifeboat, bottom upwards. We were left to draw our own conclusions!

DECEMBER 19TH.—Picked up the pilot at 1 o'clock to-day and anchored exactly opposite the radio station at Norfolk, Virginia. The harbour lies at the mouth of the Chesapeake River. When the Customs officer came aboard, he asked us to produce our radio certificates, and next startled the captain by saying that, unless we got an emergency set on board before we left port, we should be fined 5,000 dollars. I thought this would happen, because it's the rule of the Berne Convention that all ships carrying over fifty persons must install an emergency radio outfit.

THE TORPEDO STRIKES



A merchant vessel which has been attacked by a submarine. It is rapidly sinking and littering the sea with barrels. (British Official Photo).

DECEMBER 20TH.—Norfolk, Virginia. This is a pretty good town, and you can get an excellent meal here for about twenty five cents—a little over a shilling. After tea, went to a film with some friends, but found that it's the habit over here to run a show without any music at all. The programme consisted of "Oliver Twist" and one other short film. Got some excellent cigars for five cents each (about 2½d.).

DECEMBER 22ND.—Left Norfolk early this morning. Had to get up early to see about erecting the aerial, as it had been taken down in port. It had got secured at the top of the funnel, and I had to climb up the little ladder fixed at the side of the funnel to put things right. As steam was up it was not a very clean job, and it made me feel pretty giddy.

Christmas Eve.

DECEMBER 24TH. Christmas Eve, 1916. We are well *en route* for Port Arthur; it is just like the middle of August at Rustington, with a cool breeze playing all the time. Everybody is hanging out their washing, and I can hear old T—— singing in a falsetto voice. He is in a better mood to-day and is inclined to be playful. He carries on something like this when he wants Walter, the cabin-boy:

"Walter-r-r-r-r-r! Come hither, sweet youth. Administer unto me, so that I may shave in comfort!" And then, suddenly changing his voice: "And if that shaving water isn't hot, I'll break your ——— neck!"

Walter fetches the water, and as it is to his "lordship's" satisfaction, he is again all honey.

"Tell me, youth, what is for dinner? Has old Philgarlics (the chief steward) given us beef again? It is, is it? I thought as much! And as hard as his head, too. He wants Mrs. T—— to show him how to serve a meal. It would be more than her life is worth to give me beef four times a week."

Walter is an experienced and sensible youth, and he usually says just: "Yes, sir. Yes, sir!" But he put his foot in it properly a little later.

"Ah, well," continued old T——. "I suppose I'm a silly old fool, ain't I Walter?"

"Yes, sir," says Walter, not seeing the trap.

Flying Fish.

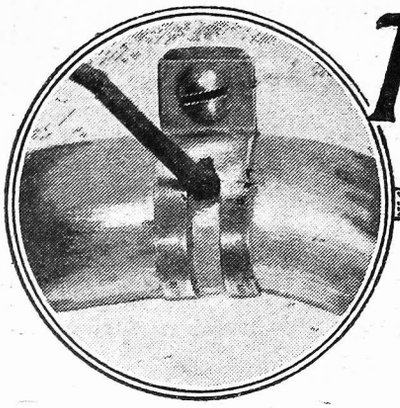
"Oh, am I?" cries old T——, all bristling beard and glaring eyes again. "You get out of this cabin, my boy, damn well quick, or you'll be in hospital for Christmas."

Exit Walter hurriedly, followed by a paper, magazine, a toothbrush, and a pair of sea boots.

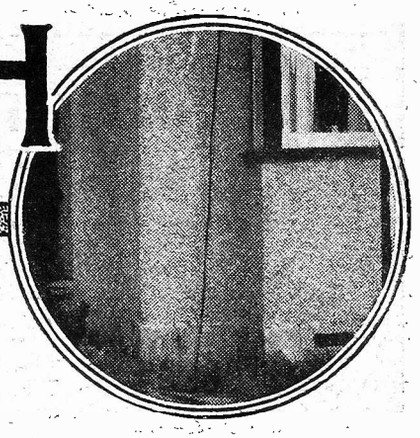
These little incidents liven us up now and then, and even old T—— admits they do him good. Have just noticed some flying fish, but they were not near enough to examine properly.

NEXT WEEK.

Further extracts from this fascinating record of radio experiences in War-time will be given in next week's "P.W."



THE EARTH "WAR"

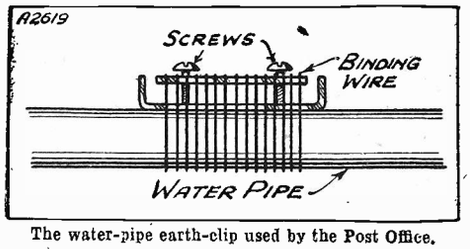


By G. H. DALY.

Some water companies object to the use of the water-pipe radio earth because, they declare, it tends to weaken the pipes. But this need not happen, as our contributor clearly shows.

PRESENT-DAY wireless was born on the day when Marconi first connected his aerial circuit to the earth. That was in 1895. Previous to this, experimenters had not dreamed of making any connection to the ground as they thought that the

THE P.O.'s WAY



The water-pipe earth-clip used by the Post Office.

energy would naturally run away to earth and be lost.

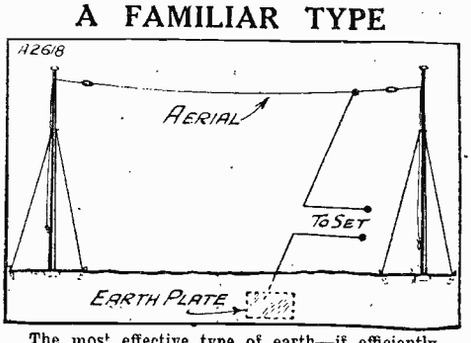
Instead of this, as Marconi remarked when receiving the Nobel prize in 1909, "the new arrangement (earthed-aerial system) not only increased the distance over which I could communicate, but also seemed to make the transmission independent of the effect of intervening obstacles."

Caused by Copper.

Since then everyone has earthed their aerial circuit—mostly to the water pipe—and wireless has simply gone ahead. Now, however, certain water companies are objecting to the use of their water pipes as a wireless earth on the grounds that damage is thereby done to the pipe.

As it happens, wireless listeners are not the only people affected, for the Post Office frequently use the water pipe for earthing their telephones—as a matter of fact, it is probable that we first copied the idea of a water-pipe earth from that source. In some cases also, electricity companies make use of the water pipe for an earth.

A FAMILIAR TYPE



The most effective type of earth—if efficiently installed.

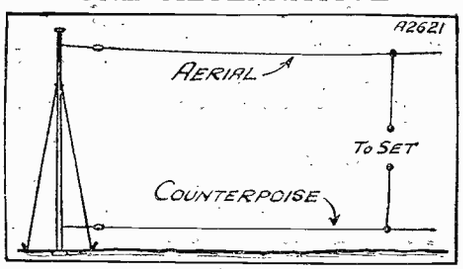
Apparently the water companies object to the use of their water pipes as an earth because the wireless listener—likewise the P.O. or the electricity engineer—generally uses a copper wire when making connection to the pipe and in time moisture and deposits in the atmosphere tend to set up chemical action between the copper wire and the lead. If allowed to continue this will tend to weaken the pipe.

Easy to Tighten.

This is particularly the case if there is a loose connection which allows the moisture to get in between the wire and the pipe. Should the wire be wrapped tightly round the pipe however, chemical action is not likely to occur; nor will it happen if the wire is cleaned periodically, say once a year, or more often.

To ensure a tight connection, the earth clip used by the Post Office is very useful, for by means of two screws the wire can be tightened up after it has been wrapped round the pipe.

ONE ALTERNATIVE



How a "counterpoise" should be arranged.

If a really effective job is desired, then a special collar should be sweated on the pipe, the earth wire is connected to a lug on the collar, and any corrosion which might occur will not affect the pipe. It should be added that sweating on to a water pipe is best done by a plumber or someone skilled in the work.

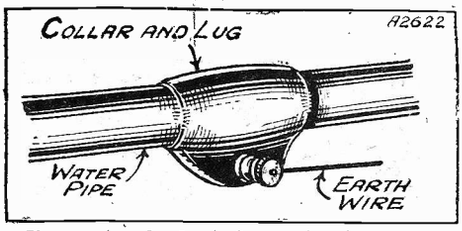
Watch the Taps.

Every professional wireless engineer examines his earth periodically, as it is one of the most vulnerable yet most important links in the system, and if everyone cleaned their "earth" periodically they would obtain much better results and give the water people no opportunity of causing trouble.

One imagines that what the water companies are really up against is the clumsy earth wire which has been hastily wrapped round the pipe and forgotten for years. Naturally corrosion has taken place and the water companies have a case. However, even the worst cases of corrosion brought to their notice cannot be so bad as to justify cutting off the wireless earth like they would the water supply.

Theoretically, at least, the water pipe is

PROTECTING THE PIPE



If you get a plumber to fix a water-pipe connection like this, no harm can come to the pipe itself.

not the best type of earth, although it may be the most convenient available. Especially does this apply where taps are inserted between the earth connection and the mains, for the threads of the tap may be coated with some insulating compound to make a water-tight job, and thus a high resistance is set up in the aerial circuit.

The Buried Plate.

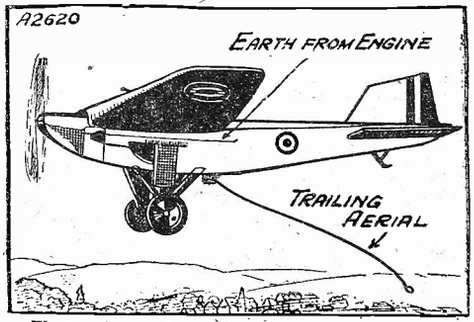
The most effective form of "earth" is that invariably used in the professional wireless world, namely the buried earth plate, and in this respect again, the standard Post Office earth plate is hard to beat for normal reception, at any rate.

This consists of a sheet of galvanised iron about 18 inches square, which is buried a foot or so under the ground: the plate has a tinned surface, so that it is an easy matter to solder a wire to it. If the soil in which the plate is buried is reasonably moist, this is superior to any water pipe.

A sheet of copper is better still, but not

(*Continued on page* 230.)

AN AERIAL "EARTH"



The engine and metal parts of an aeroplane constitute its radio "earth."

THE MIRROR OF THE B.B.C. By O.H.M.

SUNDAY PROGRAMMES

HENRY HALL SETTLES DOWN — VOICE TESTS FOR THE EMINENT — "PRODUCTIONS" PLANS.

ALTHOUGH it is true that there is no radical change of policy contemplated with B.B.C. Sunday programmes, I hear there is active discussion and growing pressure. The "Wireless Exchanges" with which the B.B.C. is doing business are naturally keen to have more week-end entertainment.

It is early yet to prophesy what may happen, but of this I am sure, that there will be no widening of the range of material tolerated on Sundays. Sir John Reith will see to that.

Henry Hall Settles Down.

Henry Hall has now had time to acquire his studio "legs." His "fan mail" has taken on prodigious proportions, letters pouring in at the rate of hundreds a day.

THE "COSMIC" BETTER THAN THE "MAGIC."

The Editor, POPULAR WIRELESS.

Dear Sir,—I have just built the "Cosmic" Three, and must again congratulate you on a really excellent set. Last Wednesday I dismantled my original "Magic" Three, not without some regrets, and constructed the "Cosmic."

I have used both the transformers and the "antimobo" device from the "Magic" Three instead of one stage of R.C.C.

This necessitated slightly greater spacing of the L.F. components, but otherwise I have adhered rigidly to specification.

The selectivity of the "Cosmic" is very good indeed—I was able on Thursday evening to listen to the 9th Symphony from Leipzig on full loudspeaker strength with interference from the London National so slight that I could only just catch the words of Mr. Otto Siepmann's talk during the one bad fade-out that Leipzig suffered throughout the whole programme.

Again, I can similarly get Mühlacker free from the London Regional, after dark.

Selectivity is also good on the long waves, and Radio Paris and the Eiffel Tower come over well at midday.

As regards the short waves, I have not yet had much time to log a large number of stations.

I listened to the "P.W." programme from C T 1 A A for some time. Most of Capt. Eckersley's speech came over at good loudspeaker strength, but fading was rather bad during Mr. Calkhurst's speech on Portugal.

Judging by the oscillations, I should say that a very large number of "P.W." readers were after this station.

Moscow's propaganda also came over at very good loudspeaker strength last evening, on 50 metres.

I find that the "Cosmic" is very stable and very easy to handle, and is a great improvement on the "Magic" Three, good as that was at the time. A great asset is the inexpensiveness of the coils required—three wave ranges can be covered for the same price as good medium-wave coils for the "Magic" cost at that time. I never got long-wave coils for the "Magic."

Again thanking you and the "P.W." staff for a really super set.

I remain,

Yours faithfully,

CHARLES H. ARNOLD.

P.S.—Much regret delay in posting. Have now logged 58 stations on the medium wave-band. Am more than satisfied.—C. H. A.

"Ecclesden," Steyning, Sussex.

It was no easy task to take over from such an overwhelmingly popular personality as Jack Payne.

But Mr. Hall has succeeded, and not least by his retiring disposition and quiet attentiveness to duty. The new band is improving rapidly and has already won its place in the esteem and affection of millions of listeners.

There is no doubt that Mr. Hall will develop a microphone personality, and even though this will be quite different from Jack Payne's, I am sure we shall like him as much as any dance band director.

Meanwhile, Mr. Payne is doing splendidly on his own, and will continue to do so for a long time to come. Apart from his recording, he is drawing big houses wherever he appears, and if the statement I heard is correct, he landed a very nice packet recently when he appeared at a suburban theatre, and drew record audiences which worked out very nicely for him under an arrangement by which he took sixty per cent of the gross receipts. His records are also going well in America.

Voice Tests for the Eminent.

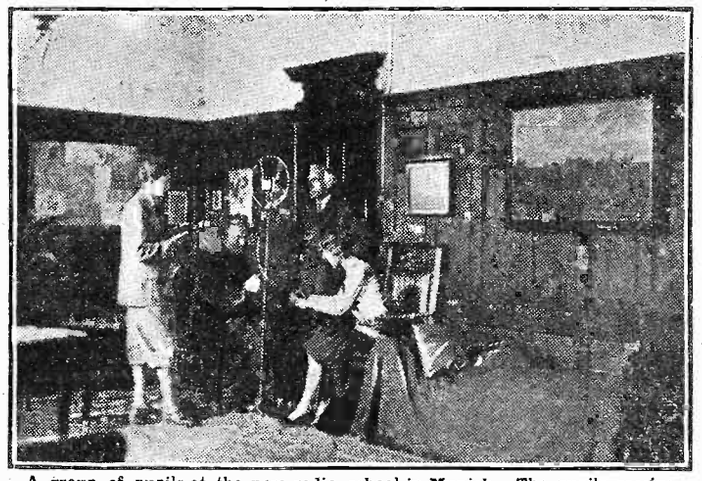
Recently there have been some shocking examples of bad microphone voices possessed by eminent talkers. I have a feeling that the B.B.C. is not as strict now as it was even a year ago to make sure that its talkers are not only masters of their subjects but also able to get over on the microphone. Anyway, there is a good deal of irritation on this score, and I commend it to the attention of the Talks Branch at Broadcasting House.

"Productions" Plans.

A show a day for a week will keep the Productions Department at Broadcasting House very busy during the early part of May. This, of course, includes vaudeville programmes for which Productions are now wholly responsible, two performances of the revived radio play, "Dr. Abernethy—His Book" (produced by Howard Rose), two performances of "Little Miss Make-Believe" (produced by its author, Charles Brewer, who is specially coming to London from Birmingham), a feature programme called "Miscellany" (produced by the collaboration of C. Denis Freeman and M. H. Allen), and the musical play, "Caractacus," the characters for which include two emperors, one of them the great Nero.

The vaudeville entertainments, without giving a lot of names, promises to be well up to standard, and that in which the B.B.C. Theatre Orchestra is taking part will introduce the "call sign" or "signature tune," built around a famous phrase from "Come, then, ring up the Curtain" ("Il Pagliacci").

LEARNING TO BROADCAST



A group of pupils at the new radio school in Munich. The pupils receive tuition in microphone speaking.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

MISS SACKVILLE-WEST'S recent talk on books will doubtless do the author of "Gay Gardening" some good, while her condemnation of Aldous Huxley's latest work will achieve no less a result for the latter. Such is the paradox of criticism. Wholehearted praise and wholehearted condemnation—both methods arouse curiosity—and increase author's royalties. I think Miss West ought, in future, to have her wrist-watch with her when she broadcasts. She made it quite obvious that the studio clock was behind her, and that she had her eye on it.

* * *

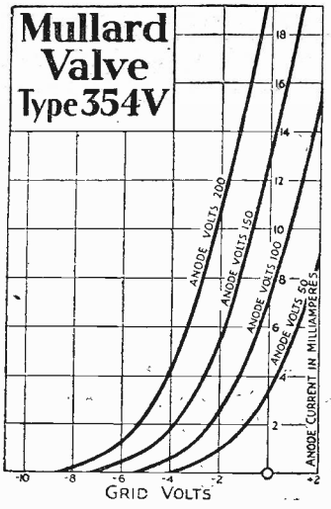
After forty-five minutes of "April Foolishness," it was clear that Leonard Henry is at his best when he has not the responsibility of supervising the production of the show. Hardly anything fell from his lips which was worthy of repetition, and as for his song, sung to his own accompaniment on the harp (?) plus a fiendish row from the orchestra—this was the worst thing I have ever heard him do. Some of the lines, too, made me wonder who had written the book of words.

* * *

It was nothing in favour of Elsie Randolph and her Merry-Go-Round Company, that they figured in the National programme the night following "April Foolishness." One had hardly recovered from the latter, which may have made one more critical; but, really, the show was a disappointment, the choice of songs being on a par with the singing, while the patter was weak in the extreme. The poorest item I have listened to for some time!

(*Continued on page* 230.)

354V



TECHNICAL INFORMATION ABOUT A FAMOUS VALVE

The type number alone tells you quite a lot about the 354V. First of all, the symbols **4V** mean that it is one of the Mullard series of indirectly heated A.C. mains valves, while the figures **3,5** indicate that its amplification factor is 35.

Your knowledge of radio technics will tell you that a 3-electrode valve having these characteristics should be an excellent general purpose valve—and that is just what the 354V is.

FOR DETECTION.

Type 354V is pre-eminently the detector for use in A.C. all-mains receivers, and particularly for sets employing one or more high frequency amplifying stages where, operating under power grid conditions and, of course, zero grid bias, it will handle big input signals and, if followed by transformer coupling, fully load the average three-electrode or pentode output valve.

FOR LOW FREQUENCY AMPLIFICATION.

As a low frequency amplifier, operated at an anode voltage of 150 to 200 volts and a grid bias of 3 to 4 volts, the 354V should be used as the first stage valve in gramophone amplifiers, in which position it will handle large "pick-up" voltages and give a high effective amplification.

The 354V now incorporates the new Mullard rigid-unit construction, and will be found perfectly free from microphonic trouble, even in large receivers and radio-grams with powerful built-in speakers.

REDUCED PRICE 13/6

OPERATING DATA.		CHARACTERISTICS. (At anode Volts 100; Grid Volts Zero).	
Heater Voltage	4.0V	Anode Impedance	10,000 ohms
Heater Current	1.0A	Amplification Factor	35
Max. Anode Voltage	200V	Mutual Conductance ...	3.5mA/V

AUTOMATIC BIAS.

If automatic bias is applied to the 354V, the biassing resistance should have a value of 1,000 ohms.

The correct Mullard valves for the P.W. "Cosmic Two" are:—
Detector . . P.M.1HL
Power . . . P.M.2A

Mullard
THE · MASTER · VALVE

MADE IN ENGLAND

Advt. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2

ARKS

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.

AS I was bold enough to predict in last week's notes, we have come now to a particularly interesting period in long-distance wireless reception. All sorts of curious things are happening, and if you do not already do so I would most strongly advise you to keep a record of your results with the receiving set during the next week or two.

Should you do this I am quite sure that you will find it a fascinating pursuit. The kind of log I suggest is this: Make a list in the order of their wave-lengths of the stations whose settings you know. Then rule off a number of columns and devote one to each night on which you indulge in long-distance work. Head each column with the date and in it make a note of the behaviour of all the stations that you pick up.

Make Use of Abbreviations.

As you won't have much room you will need to use abbreviations, and here are some ideas for these. For full loudspeaker strength insert "V.G.," for medium loudspeaker strength "G.," for something rather below this "M" (moderate), for volume so weak that it barely reaches loudspeaker level put "W." If you don't hear a station at all when you turn to its settings write "N." in your log against it.

Atmospherics are denoted by "X," fading by "F," a heterodyne by "H," complete jamming by "J," and spark signal interference by "S." Thus suppose that Vienna comes in at moderate loudspeaker strength with some fading and a certain amount of spark interference, the entry would be "M.F.S."

A Guide to General Conditions.

A log kept on these lines will show you which stations are most reliable and which are most subject to fluctuations. From it, too, you will be able to deduce which portions of the medium and long wave-band are most affected by interference of various kinds or by fading.

We are bound to have a proportion of days when atmospherics are rather troublesome, and on these long-wave reception is very seldom worth while. Apart from atmospherics though, the long-wave stations are coming in splendidly, the great majority of them being completely reliable.

The medium wave-band is crammed with interest. By all the rules, for instance, Vienna, who for some years now has not been a completely reliable station, should be making his summer exit. Curiously enough, this station is at the moment of writing better than it has been for months past.

Good Reception Maintained.

Munich, too, in the same region of the medium wave-band, shows quite a noticeable improvement instead of the decline that might be expected. On the other hand, Budapest is considerably below his best, and I have not been able to obtain more than moderate loudspeaker strength on a four-valve set for some days. To compensate for this, Sundsvall has been heard with greater strength than for a long time past! Other stations that have been well received are Strasbourg, Brno, Brussels No. 2, Milan, Breslau, Goteborg, Genoa, Hilversum, Heilsberg, Turin, Gleiwitz, Trieste, and Nurnberg.

R. W. H.

SHORT-WAVE NOTES

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

By W. L. S.

THE bulkiness of my correspondence file of late points to what the daily papers call "unparalleled enthusiasm" on the part of readers, especially new readers, in spite of the bad conditions prevailing.

Very few new stations have been logged, but of the old-stagers very few seem to be missing! Among the newcomers are Radio Coltano (Pisa, Italy), on about 43 metres: he relays the Rome programme and arrives at a strength of R.8 or so—quite a rival to Rome himself. Just above him there is another Italian station announcing as "Radio Libya," also at very good strength considering the distance—for the station is located at Tripoli. Thanks to "J.E.A." (Acton) for some of these particulars.

Are Sets Too Bulky?

"G.B.W." (Alexandria) makes a very reasonable demand for smaller short-wave receivers. He quotes the abnormally minute receivers described in QST and the A.R.R.L. Handbook—a four-valver, by the way, occupies $12\frac{1}{2}'' \times 7\frac{1}{2}'' \times 8''$! There are two ways of looking at this, "G.B.W."

It needs some real brain-work to design a set as small as this that will not only work well, but that will "reproduce" well. That is the trouble from our point of view; I could design a set of that size for myself without much trouble, but *some* of the home constructors that I have met would have a hectic time trying to make it and *then* to get it "tamed."

It is so easy to keep on the safe side—even if at the expense of compactness—that I am afraid I have always made my sets rather bulky. (My own single-valver, by the way, occupies $10'' \times 6'' \times 6''$—not quite vest-pocket size.)

A Real Enthusiast!

Our old friend "W.H.R.," of Plymouth, is fast reaching the dizzy heights. Not content with winning the broadcast section of our own Competition, he has now won the "Wireless Constructor" Competition, for which he receives a Kelsey Adaptor. From "W.H.T.'s" latest log I extract the following useful details. Nairobi appears to be good between 6.30 and 7.30 p.m. on his usual wave of 49 metres odd. VK2ME, Sydney, as usual on Sunday mornings at 7.30 or so. PLE, Java, Tuesday afternoons—generally extremely strong. Wavelength 31·86 metres. In general, reception from the East is very good, and from the West—rotten!

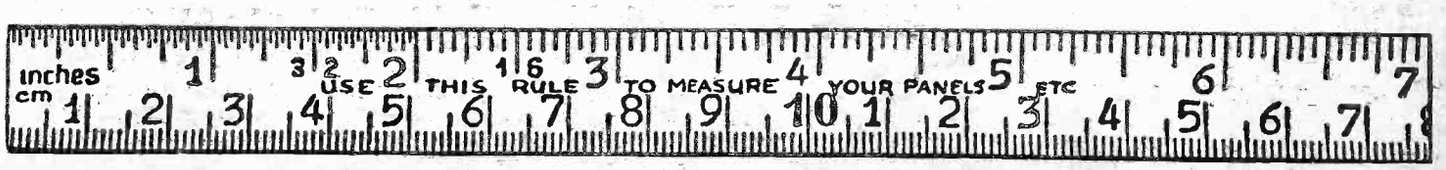
I quite expected that the volcanic disturbances that have been worrying South America would have a marked effect upon short-wave radio conditions, but, except for blanketing out stations that were only just there before, it doesn't seem to have done anything!

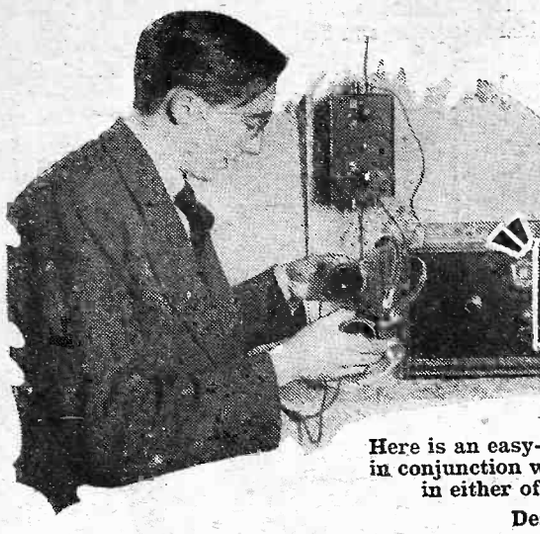
Whenever there is an earthquake or volcanic activity one usually finds that signals from that direction behave freakishly. Generally they are abnormally strong for some days afterwards, although no definite rule can be laid down from the information in hand at present.

Interesting Times Ahead.

We are fast approaching the period of the year when radio should become really lively. For the past three years my log for April, May and June has been a heavy one, both for reception and transmission, but I also note that at this time of the year good weather seems to go hand-in-hand with good DX. As I write these notes, the most incurable optimist could not call the weather "good." But on the first sunny morning (or perhaps the *second!*) I shall emulate the early bird with, I hope, equally successful results.

I added the "second" in parenthesis because someone more energetic than I am generally 'phones me after one good morning of DX and tells me all about it. Whereupon I rise at 5 a.m. the next day, completely ruin the good DX *and* the good weather, hear nothing at all and go back to bed in a profane frame of mind. But it's all in the game!





The P.W "PHONOTRAP"

Here is an easy-to-make gadget which acts as either a wave-trap or a standby crystal receiver in conjunction with any set. It can be left permanently connected up and brought into service in either of its two capacities at any moment, merely at the touch of a simple switch.

Designed and Described by the "P.W." Construction Department.

ALTHOUGH the crystal receiver as a complete broadcasting outfit has almost entirely disappeared, there is still some very useful work for the crystal detector to do in a standby device such as the "Phonotrap."

The Phonotrap is a development of an entirely "P.W." idea. It may be remembered that two or three years ago we described the construction of a small wall-fixing unit for use in connection with any valve set, and which had a pair of telephone receivers hanging on a hook projecting from the side of it.

Three in One.

So long as the 'phones were left in that position the device was inoperative. When you lifted the 'phones up and placed them on your head the valve set was automatically cut out of circuit and crystal reception possible without touching a single control or switch.

Thus you could immediately verify the efficiency of the aerial system in the case of a suspected set failure or, alternatively you could listen-in on the 'phones instead of the loudspeaker, and so save the batteries.

The Phonotrap goes one further. Instead of being completely automatic it embodies one simple switch. But the telephone receivers can be left connected all the time, and there is no need to interfere with terminals or wiring when you want to bring the Phonotrap into action.

The switch has three positions. In the one the Phonotrap is cut right out of circuit and might just as well not exist for all the interference it causes with normal reception on the valve set.

In the second switch position the Phonotrap acts as an efficient wave-trap and enables you to suppress any one medium-wave station. The third position transforms the Phonotrap into an effective crystal set so that you can pick up the telephone receivers and listen to the programme without switching on the valve set.

A Permanent Insurance.

And let us remind you that this may be extremely useful. It provides a comfortable insurance against any fault in the valve set. Supposing right in the middle of an interesting talk or entertaining concert a valve or battery packed up—if you had equipped yourself with a Phonotrap you could at least continue to listen with the telephone receivers so long as the station in question was one of the locals.

Again, it often happens that there are people in the room who do not want to listen to the radio. They needn't, but you can—on the Phonotrap.

On other occasions you will find the "trapping" powers of the little unit handy, for there are very few sets indeed so selective that they cannot sometimes be usefully assisted by a first-class wave-trap.

The Phonotrap is designed in a form suitable for fixing on the wall, although there are no reasons why it should not be stood on the table at the side of or behind the set if desired.

It is easy to assemble and the parts do not cost more than a few shillings.

A single-pole double-throw type of switch is needed, and it is important that it should have an "off" position where the "central" point does not make contact with either of the others.

Easily Constructed Coils.

It is only a few switches which provide this "off" position and the average push-pull type will be quite unsuitable.

The coil is wound on a three-inch diameter former, and only about an eighth of an inch should separate the two windings.

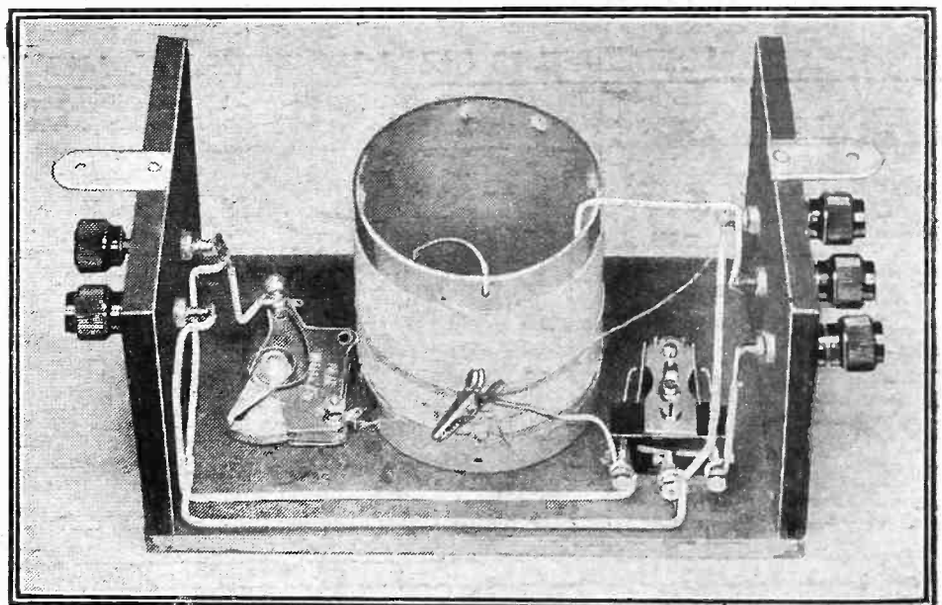
The one winding comprises a straightforward fifty turns and the other thirty-five with tappings at 15, 20, and 25. They should be wound in the same direction. You make the tappings merely by twisting small loops

(Continued on next page.)

WHAT IS WANTED

1 ·00075-mfd. solid dielectric condenser (Ready Radio, Polar, Telsen).
1 Single-pole change-over switch (Wearite, type I.11).
1 Paxolin former, 3-in. diameter, 3½ in. long.
Pieces of ⅜in. plywood, as shown in diagrams.
1 Crystal detector (Red Diamond, semi-permanent type).
5 Indicating terminals (Belling Lee type B, Igranic, Bulgin, Clix, Eelex).
2 Mounting brackets.
4 oz. No. 26 D.S.C. wire.
1 Crocodile clip (Goltone, Bulgin).
Glazite, Lacoline, Soldawyre, Quickwyre, etc.
Flex, screws, etc.

A MODERN USE FOR CRYSTAL DETECTORS



The Phonotrap is an insurance against both interference and set failures. It costs nothing to run, and will last a lifetime.

THE "P.W." "PHONOTRAP"

(Continued from previous page.)

in the wire and baring these loops of insulation.

A small crocodile clip on the end of a short length of flexible lead makes connection to one or other of the two tappings.

Wood is Good.

You need not use ebonite for the panels as wood will serve the purpose quite well. For the sake of compactness, the crystal detector (one of the semi-permanent variety) is mounted in the centre of the coil, the piece of wood which holds this being cut away to make room for it.

Side pieces can be fitted to the panels so the whole device is boxed in and its components protected from dust. If it is going to stand on a table a base of wood can be made for it.

It is simplicity itself to connect the Phonotrap up. First decide upon a convenient position for it, bearing in mind that all aerial and earth leads must be kept as short as possible and must not be allowed to run close to each other or to other leads.

The aerial lead should be disconnected from the set, and taken to the A1 terminal of the Phonotrap instead.

A short length of wire then connects the A2 terminal of the Phonotrap to the aerial terminal of the set.

Another short lead runs from the earth terminal of the Phonotrap to the earth terminal of the set. Telephone receivers are connected to the 'phone terminals on the Phonotrap.

That completes the installation, and the device can remain permanently connected to the receiving outfit, in this manner always ready to do either of two important tasks at the touch of the switch.

We referred above to an "off" position of the switch, but it should be noted that the position referred to does not coincide with the "off" of the Phonotrap.

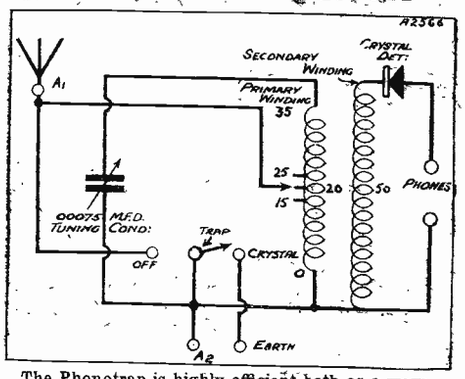
And You Needn't Re-Tune!

To switch the Phonotrap off, the switch has to do a change-over job of work! When the switch is in its central position and idling (actually it is switching nothing then) you have a wave-trap.

The remaining switch position gives you crystal reception with the aid of the telephone receivers.

You use any of the three coil tappings in accordance with the degree of selectivity you require. Use the 25 if you can, because this gives you loudest 'phone signals, and best trapping.

AN EFFICIENT CIRCUIT

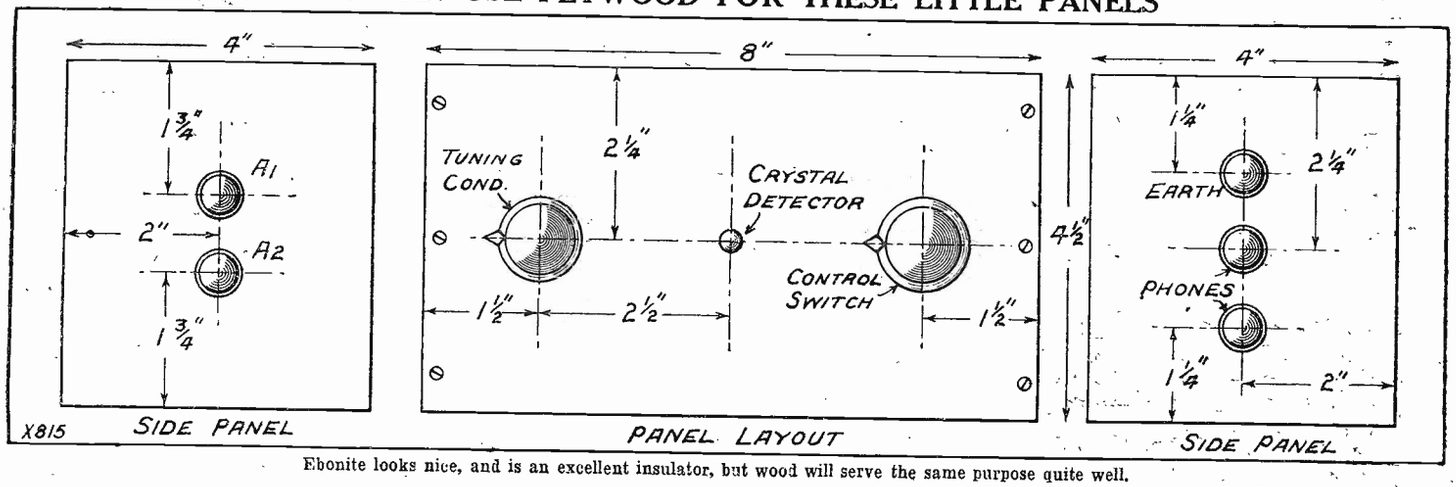


The Phonotrap is highly efficient both as a wave-trap and a crystal receiver.

You will find that if you employ the Phonotrap to wave-trap a strong local station, you will not need to re-tune when you go over to crystal reception from that station.

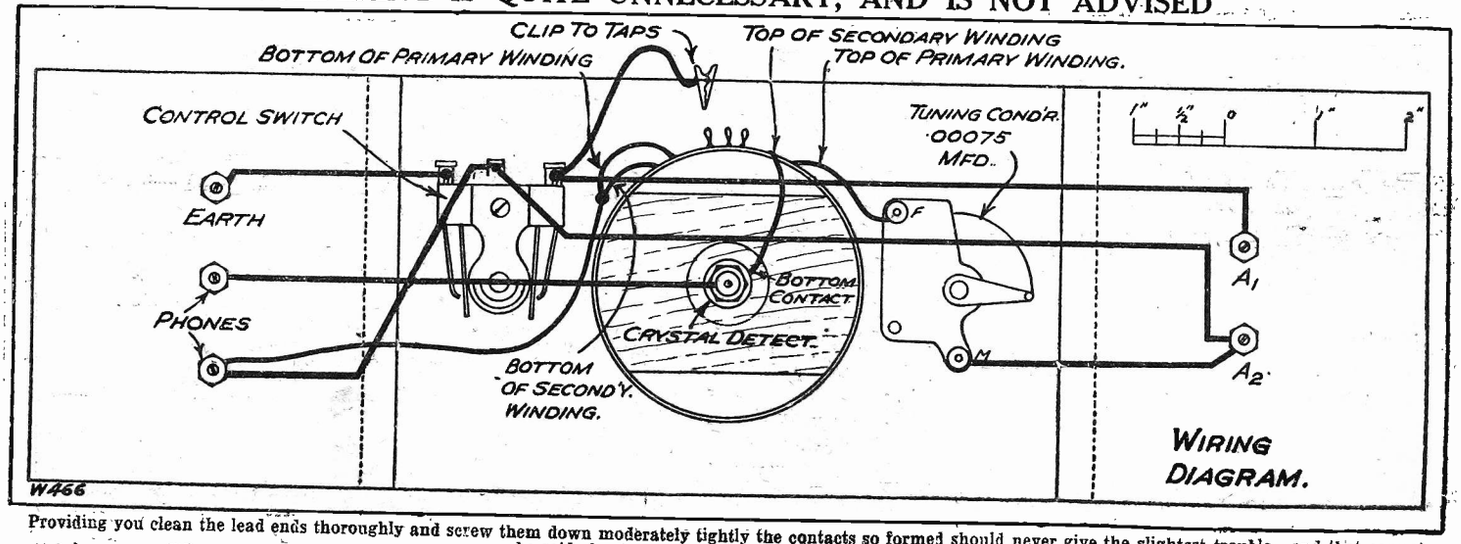
There is nothing that can go wrong in the Phonotrap, providing it is not very roughly handled, so that it is capable of giving trouble-free service for an almost indefinite period.

YOU CAN USE PLYWOOD FOR THESE LITTLE PANELS



Ebonite looks nice, and is an excellent insulator, but wood will serve the same purpose quite well.

SOLDERING IS QUITE UNNECESSARY, AND IS NOT ADVISED



Providing you clean the lead ends thoroughly and screw them down moderately tightly the contacts so formed should never give the slightest trouble—and that cannot be said about even expertly-made soldered joints.

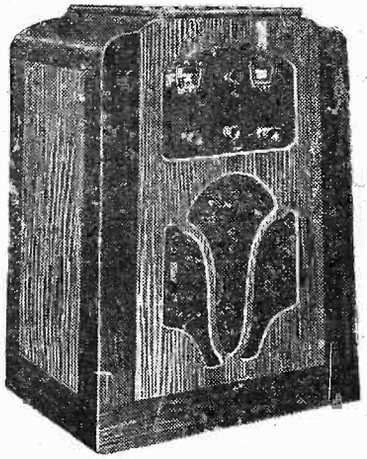
The most efficient all-wave set ever designed

Ready Radio METEOR III

Still bringing radio from America, Africa, Australia, into countless homes

Listeners all over the country tune in America, Australia, Africa, and other distant countries, as well as Home and Continental programmes, night after night, on the Meteor III. The Meteor III can justly be claimed as the most efficient all-wave set ever designed. Files of testimonials from more than satisfied constructors are open for inspection at our offices.

Ask your radio dealer for your free Meteor Folder!



METEOR Consolette Cabinet Model

Complete Kit with Consolette Cabinet, as illustrated, to house set, speaker and batteries

£5 : 0 : 0

or **11**/- down and **9** monthly payments of **11**/-

METEOR III KIT

Complete set of quality components including panel (cut and drilled), baseboard, Jiffilinx, flex, screws, plugs, etc.

75/-

or **9**/- down and **7** monthly payments of **10/6**

METEOR Standard Cabinet Model

Complete Kit with Standard Cabinet to house set only

89/6

or **11**/- down and **8** monthly payments of **11**/-

Note these special features of the Meteor—18 to 1 Slow-Motion Control on both tuning and reaction; Extended anti-capacity reaction drive; Adjustable selectivity; Kendall loose-coupled air-spaced coils; Radio-gram Switching; R.I. Transformer; Graham-Farish and Lewcos Resistances; Condensers by T.C.C. No soldering, no cutting, no drilling—a screwdriver and pliers are the only tools you need. All the necessary wires, flex, screws, plugs, etc., are included in the Meteor Kit. Mullard Valves are recommended by the designer.

Mr. G. P. Kendall, B.Sc., the famous designer of the METEOR III

Choice of Recommended Accessories

Mullard Valves

1—P.M.2 DX	7 0
1—P.M.1 L.F.	7 0
1—P.M.2	8 9

Batteries

Pertrix 120 v. Super capacity	1 5 6
or	
Pertrix 120 v. Standard	15 6
Pertrix 9 v. G.B.	1 3
or	
Ever Ready 9 v. G.B.	1 0

Accumulator

Fuller 2 v. 20 amp. type S.W.X.H.7	10 9

Loudspeaker Chassis

R & A type 40 Reproducer	16 6

Gramophone Pick-Up

ReadiRad	1 7 6

Volume Control

ReadiRad ·5 meg.	5 9

Gramophone Motor

Collaro Type B.30 with Unit Plate and Automatic Stop	1 13 0

FREE.....

Name.....

Address.....

.....

P.W. 30/4/32. —BLOCK LETTERS—IN INK PLEASE

Ask your radio dealer for your FREE Meteor Folder. If he is out of stock, post coupon now to:— Ready Radio Ltd., Eastnor House, Blackheath, S.E.3. If you also include four 1½d. stamps, we will send you Mr. Kendall's latest book entitled "Ten Hows for Modern Radio Constructors." Packed full of useful information.

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

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

.....

.....

for which (a) I enclose (b) I will pay on delivery (c) I enclose first deposit of (*Cross out item not applicable*) £.....

NAME.....

ADDRESS.....

.....

All Cash Orders of 10/- or over, post free. P.W. 30/4/32

"P.W." OFFICIAL EXHIBITORS SELL READY RADIO KITS

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?

POPULAR PRODUCTS.

USUALLY at this time of the year I find it fairly easy to keep pace with the apparatus sent in for test. But I do not seem to be able to work off my arrears this year.

Maybe there are more items sent in; alternatively, those which are may be of greater individual interest and necessitate longer reports. I haven't gone into the matter deeply, and I only refer to it in order to reassure those traders who have been anxiously waiting for their products to be reviewed that no one is forgotten, and all will have their turn.

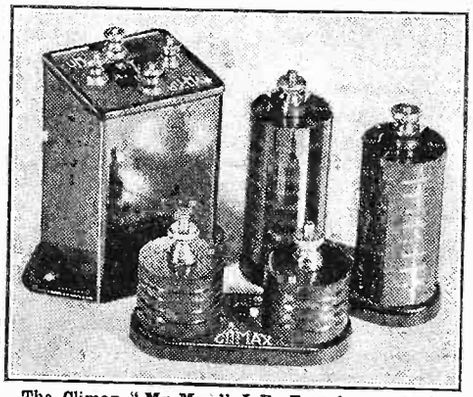
And now to business. I have three components from Climax. First of all, there is the "Mu-Max" L.F. Transformer, a workmanlike article having a 1-3·5 ratio, and selling at 5s. 6d.

It has a nickel-iron core, but can carry up to 2·5 m/a, which is rather more than the anode current found in the average detector circuit. Its inductance of 30 henries places it above quite a few of the other inexpensive transformers. And in use, within its limitations, it gives satisfactory results.

The Climax Binocular H.F. Choke is in the "de luxe" class, though its price, 6s. 6d., is not by any means forbidding. With a high inductance and an exceptionally low self-capacity, it can safely be recommended for the most critical tasks H.F. chokes have to perform.

The Bijou Climax H.F. Choke is a more "popular" model. This lists at 3s. 6d., and though, of course, it isn't equal in efficiency to the more expensive model, it is capable of doing all the ordinary jobs with complete effectiveness.

THREE CLIMAX COMPONENTS



The Climax "Mu-Max" L.F. Transformer and Bijou and Binocular H.F. Chokes.

GOOD WOODWORK.

Picketts are maintaining their standard of excellence, I am glad to note, from their latest Piano-Tone radiogram cabinet, a sample of which reached us some few weeks ago.

I am glad for personal reasons, because good craftsmanship is so satisfying to anyone with the slightest shred of artistic fibre in their make-ups. And in nothing but wood do you get such a complete presentation of craftsmanship pure and simple—or, at least, that is my opinion.

A FINE CABINET

Messrs. Picketts' excellent radiogram cabinet.

In a world in which so much of what we see and use is the result of duplication by machines, it is refreshing just to look upon a piece of work which has been fashioned by the cunning hands of the skilled craftsman. And I should feel grateful if I could think that my ideas were widely shared.

But to revert to the Picketts Cabinet. As no doubt I have plainly indicated, I consider this to be a fine example of cabinet craftsmanship, although I must admit I can assess such things only as an ordinary user. I am not an expert in joinery and carpentry, but I think I can discriminate fairly well between the finished products of these crafts!

SAFE AND SOUND.

There is a great deal to be said for an air-dielectric differential reaction condenser, and not much for many of those which use solid dielectrics. That is from a technical point of view. On the score of cost the solid-dielectric has a big advantage.

But with the Polar Low-Loss Air-Dielectric type before me as I write, I cannot help thinking that it will not suffer greatly by this price disparity.

It costs 5s., but it does render the employment of a safety fixed condenser quite unnecessary as a precaution against H.T. short circuits, and that is something very tangible to add to its credit account.

Also, it is an excellently made component, and it has a beautifully smooth action.

For tasks where high electrical efficiency is demanded, such as, for instance, tuned circuit volume control and selectivity adjustment "bridges," it is almost indispensable, for air is the only dielectric which can be unreservedly trusted!

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.

THE "PIX."

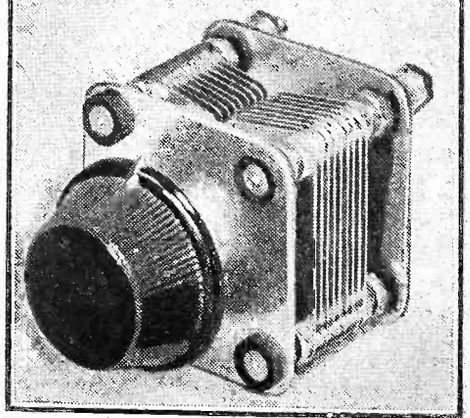
Nearly every listener I meet these days asks "What do you think of the Pix?" And they seem quite surprised at my brief answer: "Quite O.K., well worth trying if your set isn't sufficiently selective," for many seem suspicious of its claims. But they need not be, for one of the widest-used arrangements for improving selectivity is a series aerial condenser, and the Pix is a variable condenser of a convenient form for the purpose, available at a price below that of any ordinary condenser.

So that "quite O.K." is, in fact, quite a modest appraisement of its virtues.

It is of tubular construction, and has a terminal at each end, to one of which you connect the aerial lead-in and to the other a short piece of wire for joining to the aerial terminal of the set.

By pulling in and pushing out the tubular section of the article you can vary selectivity, while an excellent pre-detector volume control is also afforded. And in cases, when a high-capacity aerial is employed, it may often happen that improved sensitivity actually results.

A LOW-LOSS CONDENSER



The Polar Air-Dielectric Differential Condenser.

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.

That New Aerial.

B. B. (Stratford).—"I am about to erect a new aerial—there are two possible positions for same. In one case the aerial will be approximately 40 feet high with a "roof" portion of 40 feet—in the other case the aerial will be practically vertical, without any 'roof,' clear of all obstruction, and with an average height of 50 feet. Which would you imagine will give me the best results for use on the medium broadcast waveband?"

I do not think there will be much to choose between them. It's effective height you want. The vertical wire will have an effective height of about $50 \times 0{\cdot}5 = 25$. The other about $40 \times 0{\cdot}66 = 26{\cdot}4$.

No! It doesn't matter. Particularly for reception where an ounce of valve gain is worth a pound of effective aerial height.

* * *

Why "Transformer"?

B. W. (Hanwell).—"I should be pleased to know exactly why an L.F. transformer is known by this name. So far as I am aware the function of this component is to amplify and therefore the name seems misleading."

You cannot amplify by means of a transformer if by amplify you mean increase power. If I have 10 watts of energy given me I cannot by any conceivable means make this into 20 watts without adding another 10 watts.

True, a transformer may amplify volts; you can put 2 A.C. volts into a primary and get 200 A.C. volts from the secondary. But volts by themselves do not represent power.

If I put in 2 volts and 2 amps into the primary (in phase) I put in 4 watts. If I had a 100 per cent. efficient transformer I should have 200 volts at the secondary, but only $\frac{1}{50}$ ampere, because $200 \times \frac{1}{50}$ (secondary power) $= 2 \times 2$ (primary power) $= 4$ watts.

So I may have amplified volts by the transformer, but I have proportionately decreased the amps.

Of course, when you do not use power (appreciably) as in a low-frequency amplifier transformer you do get an apparent gain because, say, 2 volts 0 amps from one valve may be made into 6 volts input to the grid of the next valve (suitable negative being applied).

But eventually my loudspeaker demands power, and if the aerial power is 1 milliwatt and the loudspeaker wants 500 milliwatts, we've got to use amplifiers—no transformer would ever help.

So the transformer transforms the form of energy, not its magnitude. It may amplify volts or amps, but never both together.

* * *

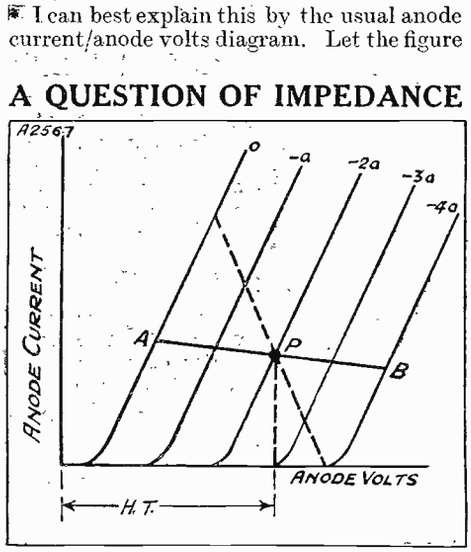
When the Milliammeter Kicks Up.

E. T. (Cricklewood).—"The last valve in my receiver is a P.X.4. I find that the needle of a milliammeter connected in the plate circuit always kicks upwards.

"I have varied the grid bias as much as I dare, but cannot cure the meter kicking, which occurs even with very moderate volume. Can you suggest any other procedure?"

I can best explain this by the usual anode current/anode volts diagram. Let the figure

A QUESTION OF IMPEDANCE



This sketch illustrates how a high anode impedance prevents bottom bending, as explained in the reply to E. T. of Cricklewood.

represent the usual scale the anode current along the vertical axis, and the anode volts along the horizontal axis, and let the curves be for various values of grid negative: O— (—a) (—2a) (—3a), etc.

Now suppose you have a value of grid negative (—2a) before you modulate and an H.T. volts = H.T.

Now suppose your anode impedance is such that on range from —2a to 0 to—4a the anode/current anode/volts are succes-sively represented by the dotted line passing through P. There is more current on the one sweep of grid voltage than on the other.

But if you increase the anode impedance the curve will be as A P B, and the current increase in the positive grid voltage sweep will equal the current decrease on the negative voltage sweep.

By increasing the anode impedance you stop bottom bending, as it is called or, as I should say, you keep the load line (A P B) symmetrical. The slope of this line is proportional to the anode impedance.

Note if you move P with a steep load-line (i.e. change your grid voltage but keep an insufficient anode impedance) you always make one half of the line longer than the other, and so the grid sweeps always make the anode current milliammeter kick upwards. Try and increase your anode impedance.

* * *

A Queer Case!

B. M. R. (Barnet).—"Some time ago I constructed a portable receiver, the aerial being wound around the wooden framework of the set, and this then being mounted inside a metal attaché case. No results at all could be obtained with this set until it was removed from the case, when the performance was excellent.

"I should be pleased if you could explain this, as I have always understood that there is no reason why a coil should not be placed in a screening box. And, after all, surely a frame aerial is a tuning coil?"

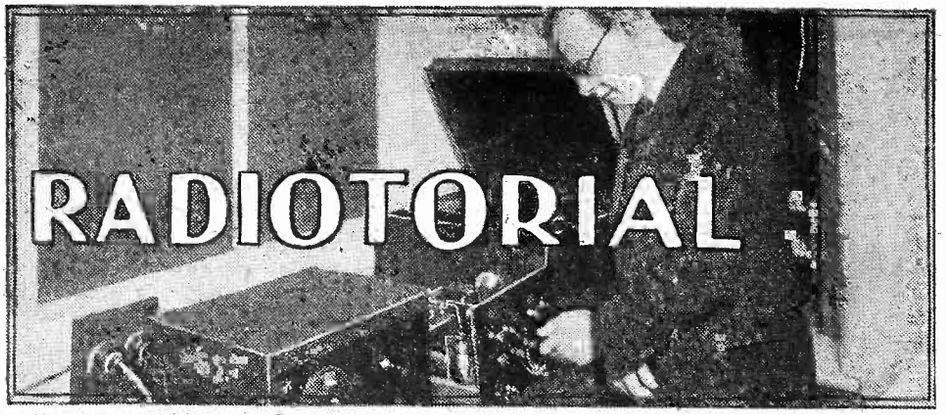
The essential of wireless reception is some form of aerial. An aerial is an *unshielded* conductor stuck out from the set to pick up the ether wave energy radiated from the transmitting station.

If the aerial is metallically shielded the waves cannot penetrate the shield, and the aerial is useless. An inside aerial in a steel frame building is frequently useless for picking up the energy from the waves, because it is shielded. Thus, the aerial must be exposed and unshielded.

The aerial in a portable set is a wire wound round and round a framework. This frame aerial is, however, exposed to the waves.

Just like any other aerial, it must not be shielded. You have shielded your aerial.

An inductance coil in a set can be shielded—sometimes *must* be shielded—because it does not pick up waves. Its function is to be tuned and present a different impedance for different frequencies.



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

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

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

QUESTIONS AND ANSWERS

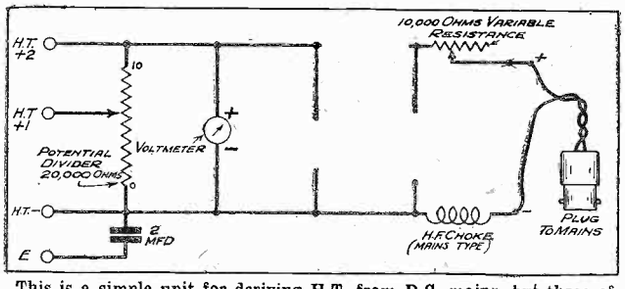
HINTS ON SHORT WAVES.

"JASON" (South Croydon).—"I am told that the 'Leviathan' and various other big ships can sometimes be heard on the short waves, but I have never been lucky enough to strike one of these. Could you tell me more or less the wave-lengths which are likely to be used?"

There are four different wave-lengths used by this class of vessel on the short waves: 17·05 metres; 22·68 metres; 33·95 metres; and 71·82 metres.

MISSING LINKS, No. 33

A D.C. MAINS UNIT.



This is a simple unit for deriving H.T. from D.C. mains, but three of the "components" have been omitted. Can you fill them in correctly?

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

ANSWERS TO "MODERATORS."

L. E. (Nottingham).—No. With that set it should be quite unnecessary to moderate, and the fault that is causing your non-selectivity would not be improved by adding a moderator coil and condenser. Your best plan is to write to the makers, asking what they can suggest—possibly they know from experience an easy cure which does not invoive altering the circuit.

* * *

L. B. (Deptford).—We shouldn't bother with the Selector, but just "moderate" as explained elsewhere in these columns.

* * *

D. F. G. R. (Streatham).—No advantage, as selectivity is adequately catered for already in that circuit.

PROBABLY THE RESISTANCE.

F. O. P. (Stafford).—"When the article on the 'Eckersley' Three was published in 'P.W.,' I was using something pretty good in the detector and two L.F. line. But the description made me feel dissatisfied, and it seemed to me that the new set was just what I wanted.

"So I put it up from the how-to-make-it details in the second article, and it delivered the goods in fine style. Plenty of foreign stations every night and, what was more, no trouble at all between any one and the next one when once the handling is mastered.

"It opened my eyes as to what can be done in the way of separating stations with only a three-valve set, and even when the 'Cosmic' came along I felt I did not want to change my 'Eckersley' Three for a time, anyway.

"But now I have come across a fault in it which I cannot trace. Can you help me to decide where to look for it?

"The symptoms are that between one week-end and the next all the strength seems to go from the set. The North Regional was only about half strength, and some of the foreigners which I had heard easily and clearly on the loud-speaker were now so weak that they were not worth listening for.

"Long waves were just as bad as medium, and instead of getting six or seven stations above 1,000 easily, almost any evening, I found I was confined to 5 X X. So far as I could see nothing had been altered on the set at all, nor on the aerial nor earth nor anything like that.

"Being worried about it, I got a chap to come in and look at it, and he knows a good bit about wireless, and suggested that I should take the aerial to the *second* coil on the tuner instead of the first.

"To my astonishment this change-over seemed to put it right, for everything came out successful and everything got back to full strength again. Naturally I could only tune on the *second* condenser instead of on both, but although strength is now good, the snag is that I have lost that marvellous selectivity.

"With this altered arrangement the loud programmes 'overlap,' and I feel I am not using the tuner as it should be used. What would be likely to be the matter with this, and what is the best way to put it right?"

If a careful examination of the wiring of the unit shows that it is intact and has not received accidental damage in some way, we should suspect that the coupling-resistance has become faulty. This would certainly be rather an unusual fault, as such a resistance should last indefinitely, the current it being required to carry being very small. But if a fault does develop in a resistance, the symptoms are exactly as you describe.

So it would be well worth trying to see if this is the cause of the trouble. All you have to do is to fix a high resistance of very roughly the same value (that is anything from, say, 50,000 to 250,000 ohms) in the place of the present resistance.

HOW ARE YOUR RESULTS NOW?

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

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

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

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

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

Possibly the connecting of this *in parallel* with the original resistance would cure the fault. Or it may be necessary to undo the present resistance and place another (such as a low-value grid leak) in its place.

You will find that if you use a low resistance, such as a low-value grid leak, in place of the original resistance, projecting through the hole in the screen, you get a little extra strength but some of the selectivity is lost, so it might be just as well to experiment with several resistances before finally wiring up the new arrangement.

USING A DUAL-RANGE COIL UNIT.

J. R. (Cricklewood).—"I have a dual-range aerial coil (Telsen), and would like to try this in the 'Comet' Three if this is possible, and should be glad if you would advise me through 'P.W.' how to wire it up."

The aerial lead which went to the ·001-mfd. max compression condenser now goes to either 1 or 2 on the dual-range unit. The ·002-mfd. max. type of compression condenser that was formerly joined to the ·0005-mfd. tuning condenser is not now required, and can be removed and at the same time the wiring to the fixed plates of the differential reaction condenser and to the three-point switch can be disconnected, and joined up as follows:

One of the contacts on the three-point switch goes to No. 4 terminal on the unit. Another contact on the three-point switch goes to No. 3 on the unit.

The remaining contact on the switch goes to earth, to one side of the differential reaction condenser fixed plates (F2), to the moving vanes on the ·0005

(*Continued on page* 230.)

"P.W." PANEL, No. 69. WAVE-CHANGE SWITCHES.

The choice of a wave-change switch is always a matter of importance, as any inefficiency here will reduce results permanently.

* * *

Be sure to purchase the correct *type* of switch—there are many kinds, apparently similar, which are not interchangeable.

* * *

In general, a strong positive "click" is desirable as indicating good contact. And the switch points should be of the type kept clean and bright by use. Other advantages to watch for are well-spaced contacts, strong terminals, and easy and efficient panel-mounting.

THE BASIS OF EXCEPTIONAL SETS

12/6

5/6

The Mighty Lissen Power Pentode and the Lively Lissen Detector

You can use these valves in any set with one stage of L.F. amplification and get better results from your set than ever the original designer dreamed of. The lively Lissen Detector Valve brings in the foreigners like magic. It adds amazingly to the range of any receiver. The Lissen Power Pentode, whose magnification factor is more than 90, gives volume such as you have never heard before. Many more stations, and all loud and clear, crisp and enjoyable to listen to—that is what these two valves give you.

LISSEN P.T. 225

The Lissen Power Pentode Valve—P.T.225—converts any set with one stage of L.F. amplification into a fine, full-volume "Pentode-output" receiver. This valve puts new power into your loud-speaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get an amazing step-up in volume. And it takes no more current than the power valve it replaces—its H.T. consumption is only 7 m/A.

Ask for Lissen P.T.225. Price **12/6**

LISSEN H.L.210

The Lissen Detector Valve—H.L.210—livens up your tuning, gives you extra range, greater sensitivity. It is so responsive that it brings the foreign stations in like magic. Not only this, but it passes a crisper, more powerful signal on to the L.F. stage of your receiver, and you get louder, clearer radio altogether.

Ask for Lissen H.L.210. Price **5/6**

LISSEN VALVES

A Brilliant British Best!

LISSEN LIMITED WORPLE ROAD ISLEWORTH MIDDLESEX

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 228.*)

tuning condenser, to Nos. 6 and 7 on the coil unit, and to L.T.— filament, grid bias + etc. as before.

The other fixed vanes of the differential reaction condenser should be connected to No. 5 on the unit. Finally, the fixed plates of the ·0005-mfd. tuning condenser and the ·0003-mfd. grid condenser, which are joined together, should be taken also to the No. 8 terminal on the coil unit, and this completes the wiring.

THE EFFECT OF HEAT ON A RESISTANCE.

S. L. J. (Morpeth).—"I had often noticed that a resistance tended to get a little warm when current is passing through it, but I did not know before to-day that the value of a resistance increases with its temperature. Is this always the case?"

All ordinary resistances increase with an increasing temperature, and conversely at very, very low temperatures all resistances become more conductive. It is thought that if metals were brought to a temperature of absolute zero, they would prove to have no electrical resistance at all, but such a condition has not yet been obtained in practice.

MODERATING "THIS YEAR'S TITAN."

B. A. (London, N.10) asks how medium-wave selectivity can be improved on "This Year's Titan." As there appears to be a large number of other readers requiring the same information, the wiring for this is given below:

At present aerial goes via switch S_1 and C_3 to A terminal on the coil unit, and this is joined by a flex to one of the tappings on the coil.

The moderator coil and condenser are inserted between this flex and the rest of the circuit, so undo the flex from its coil winding terminal or socket (leaving one end of it still joined to A) and join this flex to one end of the moderator coil, and to one side of the moderator condenser.

The other side of the moderator condenser goes to one of the S terminals on the coil unit—that terminal which is nearer to the tapped end. If you cannot see which is this end, try it first on one and then on the other S terminal when the rest of the wiring is complete.

Now join the other "end" of the moderator coil to the tapping on that unit which was formerly carrying the flex (aerial) connection from A terminal.

The arrangement will result in a very great increase in selectivity when operated as already explained in the moderating articles.

TECHNICAL TWISTERS

No. 111
THE ECKERSLEY TUNER

CAN YOU FILL IN THE MISSING LETTERS?

In principle the Eckersley Tuner consists of two sharply tuned circuits coupled through a . . . . . .

* * *

The first of these circuits is fed through a . . . . . aerial condenser which governs selectivity, and the setting of this condenser therefore affects the . . . . . of the first circuit.

* * *

In size the two coils are unusually . . . . . and to prevent unwanted coupling they are separated by a . . . . . .

* * *

The overall selectivity is very high, and the second circuit is not affected by other adjustments, so it is usual to . . . . . the tuner's second circuit and not the first.

Last week's missing words (in order) were: Longer, smaller, maintained, deteriorate, charging.

THE LISTENER'S NOTEBOOK

(*Continued from page 220.*)

There was a tremendous puff for England, as a holiday resort, in a recent Copenhagen Sunday morning programme. I was expecting to hear a talk about Gladstone, but instead, a Dane, who evidently knows his England well, went into ecstasies over our countryside, and urged his fellow-countrymen to take a holiday here. He particularly emphasised that such a holiday meant little of London, or such places as Oxford. His praise of our villages and inns rivalled even S. P. B. Mais at his best.

* * *

I sympathise with those long-suffering listeners who, for geographical reasons, are forced to listen to the London Regional's programme of music night after night. No wonder some of them are crying out for Chess talks! Their preference for such is probably because these would be given in the real spirit of the game, and would not take as long. Anything for a respite from music, music and music, they say.

* * *

I wouldn't dare to question Evelyn Scotney's claim to international fame as a soprano, but when one cannot tell whether she is singing "I heard a Piper Singing," or "Nel Quest' Occhi" (for I know the music of neither song), it makes one wonder why patrons of celebrity concerts don't insist more on hearing the words as well as the tunes.

* * *

Professor James Ritchie's first of his new series of Nature talks augured well for the future. Both matter and manner combined perfectly to produce a talk of exceptional interest. No less pleasing was the professor's delightful touch of humour which he introduced into his remarks.

* * *

What was the big idea behind "Arrest in Africa"? "Geography as she is taught" do I hear you say? Perhaps you are right, for I couldn't see anything else. There was certainly no story in it, although one was always threatening to develop. There were, I confess, one or two good songs, and once again the effects department had a real good time, particularly in "the wild and terrible din of the jungle's" scenes. The train, of course, came out again—this time in Nairobi.

* * *

Mr. E. L. Watson's talk on "Singing Mice and Other Small Deer" was in point of fact a discourse on *a* singing shrew and almost every conceivable small *bird* to be seen in Britain. Why this title, then? And the title itself is intriguing. *Do* singing mice and small deer belong to the same *genus* of animals? I'm no naturalist, but I've my doubts about it.

THE EARTH "WAR"

(*Continued from page 219.*)

so hard-wearing and is more expensive, and of course, the bigger the sheet the better. A biscuit tin, copper tube, or something similar is usually equally effective. If possible the earth plate should be buried directly underneath the aerial lead-in. This will ensure the earth wire being as short as possible, and conform to the wireless requirements of the aerial system.

For instance, the aerial system can be regarded as a condenser; the aerial itself forms one plate of the condenser, the air is the dielectric, as with an ordinary air condenser, and the ground, particularly that immediately below the aerial, is the other plate of the condenser. Thus, the nearer the earth connection is to the ground immediately below the aerial the more effective will be the wireless set.

Those Dry Earths.

Some people complain that their buried earth is not so good as the water pipe, although they may have buried quite an elaborate affair. This is generally because the soil in which they have buried the plate is of a particularly dry and insulating nature. Some parts of the earth's crust are quite good insulators, and this insulation is increased if the ground is dry. Wetting the earth will cure the trouble, and if possible the earth plate should not be buried under the eaves or porch of a house, but in the open where it will receive plenty of rain. In sensitive sets, by the way, a long earth wire will tend to cause oscillation, but it is better to have a long earth wire rather than an "earth" buried in dry soil.

The type of ground upon which the house is built is, of course, very important from the wireless earth point of view. For example, Zenneck's theoretical calculation shows that the particular wireless waves which will travel for 700 miles over wet soil will only travel for 55 miles over very dry soil.

Counterpoise Connections.

In a similar way this applies to the "earth," for dry ground offers much greater resistance to the oscillatory currents in the aerial circuit than does damp ground.

Of course, a connection to the earth is not altogether necessary. Aeroplanes manage without it by using the system known as the counterpoise.

To use a counterpoise it is only necessary to run another aerial wire along the ground or floor and connect it to the earth terminal on the set. The best results are usually obtained when the counterpoise aerial is immediately below the ordinary aerial, provided the latter is fairly high up. The counterpoise principle is also useful sometimes for cutting out bad electrical interference.

Then, of course, there is always the loop or frame aerial to fall back upon should the worst come to the worst. But this is hardly likely, for investigation will undoubtedly show the water companies the error of their ways, for there can be no serious harm to the water-pipe if reasonable care is taken. At the same time it is an ill wind that blows nobody any good, and if the water companies' attitude makes us bury our "earths," or even pay more attention to them, then the "war" has done some good after all.

WHERE YOU CAN SEE "COSMICS" AND "S.T. 300's."

A further List of Retailers who have Registered as Official "P.W." Exhibitors.

LONDON.
H. Amos, Esq., 244, Earlsfield Road, Wandsworth, S.W.18.
Andy's Radio, 285, Edgware Road, W.
Bearman Bros., Dalston Junction, N.
Beresford Bros., 6, Beresford Square, WOOLWICH.
J. H. Boddy, 819, Fulham Road, S.W.6.
Cadisch & Son, 56–8, Eagle Street, W.C.
Clarke, A., 22–4, Market Hall, FULHAM.
Crompton, S. & J., Ltd., 129, High Road, CHISWICK, W.4.
Direct Supply Stores, 62, Lower Marsh, Waterloo S.E.
District Gramophone, 315, Old Kent Road, S.E.
District Supplies, 11, Brushfield Street, E.
Elkay Wireless, 225, Bishopsgate, E.C.
Fudge, A., & Sons, Bendall Street, Lisson Grove, N.W.1.
Gas Light & Radio, 464, Holloway Road, N.5.
Grey, S., & Co., 745, Barking Road, E.
Harmo Products, 46, Hoe St., WALTHAMSTOW, E.
Hewitt & Co., 21, South Street, GREENWICH.
Hogben, 272, High Road, TOTTENHAM.
Hurley & Baker, 172a, Roman Road, BOW.
Keen Wireless, 1, Dane Road, EALING.
Kerr, W., & Co., 107, West Green Road, TOTTENHAM.
Landau, M., 66, High Street, CAMDEN TOWN.
Lighting Supplies, 305, Green Street, UPTON PARK.
Metropolitan Lighting Co., 25, Atlantic Road, S.W.9.
Pearl & Moore, 168, Strand, W.C.
Pearl & Pearl, 190, Bishopsgate, E.C.
Peckham Radio, 152a, Rye Lane, PECKHAM.
Polchar's Wireless, Ltd., No. 5, Manifold's Market, Rushey Green, CATFORD, S.E.
Polchar's Wireless, Ltd., 175, High Road, BALHAM, S.W.
Popular Wireless, 101, Falcon Road, S.E.11.
Rayette, 128, King Street, HAMMERSMITH.
Sacks, D., 130, Kentish Town Road, N.W.
Service Radio, 210, High Street, SHOREDITCH, E.
Sovereign Products Ltd., 52–54, Rosebery Avenue, E.C.1.
Stone, M., 66, High Road, BALHAM.
Super Radio, 31, Surrey Street, CROYDON.
The Peto Scott Company, Ltd., 77, City Road, E.C.1.
The Peto Scott Company, Ltd., 62, High Holborn, W.C.1.
Tower Radio, 5, High Street, SHOREDITCH.
Waldron, A. W., 60, High Street, HOUNSLOW.
Western Lighting Co., 77, Mitcham Road, TOOTING.
Wholesale Components, 8–8a, Cross Street, ISLINGTON.
Williams Lighting, 2, High Street, TOOTING.

ABERDEEN.
Paton, P. F., 34, Portland Street.

BRISTOL.
Polchar's Wireless, Ltd., 20, Bridge Street.

CHESHIRE.
R. Manning, Esq., Engineer, Acton Bridge, NORTHWICH.

DAGENHAM.
Acme Wireless, 9, Goresbrook Road.

DERBY.
E. Peabody, Three Gables, High Street, STAVELEY.

EDINBURGH.
Clydesdale Supply Co., 66, South Bridge.

GLASGOW.
Clydesdale Supply Co., 63, Renfield Street.
Clydesdale Supply Co., 160, Sauchiehall Street.
Cohen, S. W., 7–15, King Street.
Youngs (Glasgow), Ltd., 40, Stockwell Street.

GODALMING.
Jordan's Garage, Ltd., 11–13, Ockford Road.

GOSPORT.
Hardway Radio, 26, Grove Road South.

KENT.
Ware, F. G., Sellindge, Nr. Ashford.

KIVETON PARK.
H. P. Snowden, Esq., Snowden's Wireless Stores, Station Road.

LETCHWORTH.
Millard, P. C., 195, Glebe Road.

(Continued on next page.)

WHERE YOU CAN SEE "COSMICS" AND "S.T.300's."

(Continued from previous page.)

LINCS.
Park Bros., 11, King Street, BARTON-ON-HUMBER.
E. Pearce, Esq., 32, North Street, BOURNE.

LIVERPOOL.
City Wireless, 80, Whitechapel.

MANCHESTER.
Hunter, 7, Cumberland Street.
Vernon, C. N., Ltd., 11, Halliwell Street.

MONMOUTHSHIRE.
Douglas C. Osborne, Modern Music Depôt, CWM.

NEWCASTLE-ON-TYNE.
Accumulator Construction Co., Powdene House, Pudding Chare.

NOTTINGHAM.
Hastings, H. B., 210, Waterway Street, Meadows.

PETERBOROUGH.
R. J. Croft, Esq., Main Street, FARCET.

PORTSMOUTH.
Keost, W., 290–302, Commercial Road.
Wells, L. F., 4, Fourth Street, St. Mary's Road.
Wild Bros., Arundel Street.

RAWTENSTALL.
O. Borsay, 101, Bank Street.

ST. ANNE'S ON SEA.
E. Sumner, Ltd., 14, St. Andrew's Road South.

STAFFORD.
E. B. Clendinnen, 37, Cramer Street.

STOKE-ON-TRENT.
"Bews," Bews Corner, BURSLEM.

TWICKENHAM.
C. Margrave, 38, York Street.

WALLASEY.
Cheshire Wireless Co., 98–100, Brighton Street.

WARMINSTER.
The Orchestron Radio Service, 10, Market Place.

WARRINGTON.
J. Lawson, 26, Horsemarket Street.

WELLING, KENT.
S. A. Holmes, Holmes Stores.

WEST BROMWICH.
W. Hughes, 30, Bull Street.
E. J. Spiers, 345, High Street.

WESTCLIFF-ON-SEA.
Chalkwell Electric & Radio, 881a, London Road.

WEST HARTLEPOOL.
C. H. Ilderton, 79B, Musgrave Street.

WEYBRIDGE.
E. W. Farrow, 42, High Street.
E. Rogers & Sons Ltd., 56 and 58, High Street.

WHITEFIELD, LANCS.
Turner & Booth, 228, Bury New Road

WHITSTABLE.
Masons Motors, Canterbury Road.
E. C. Spray, 13, Harbour Street.

WILTS.
T. E. Bailey, Esq., The Bazaar, PEWSEY.

WISBECH.
C. H. Plummer, 37, West Street.
Rouse's, Hill Street.

WOLVERHAMPTON.
Cox & Tustin, 26, Broad Street.
Fenwick's Radio Stores, Gt. Brick-Kiln Street.
G. R. Griffiths, 21, Steelhouse Lane.
Radio Services, Market Street.
Wolverhampton Radio Installation Co., Ltd., 56, Victoria Street.

WOMBWELL.
E. Denton, 75, High Street.

WORKSOP.
E. Sugden, 109, Gateford Road.

YARDLEY.
P. J. France, 60, Church Road.

YORK.
A. L. Kemp, Esq., Grayke.

MORE NAMES NEXT WEEK.

TECHNICAL NOTES

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

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

Mains Power Valves.

I AM often asked about mains power valves with directly-heated filaments as compared with those having the popular indirectly-heated type of cathode. Some readers seem to think that the indirectly-heated type gives less hum and noise, but in actual practice I think that the directly-heated type has been so improved that really there is not much to choose between the two. The directly-heated type of power valve uses a thick filament, and this goes a long way towards levelling out the electrical variations which would cause a hum.

The electrical connections I have mentioned in these Notes some little time back, so I need not refer to those again. As regards the indirectly-heated type, it is obvious that this, if properly constructed, should cause very little hum; and, in point of fact, the better types of these valves now on the market are remarkably efficient in this respect.

Background Noises.

Of course, I do not think it is fair to say that a mains-driven receiver is ever *quite* as free from background as a battery-driven one—I mean, naturally, when the batteries are in proper condition and there is no crackling and so on, due to run-down or defective batteries. It is not so long ago that the background of hum with an A.C. receiver (or a D.C. one, for that matter) was quite pronounced, but nowadays this has been smoothed out so as to be almost imperceptible.

Theoretically the current supply from the A.C. can never be quite as smooth as that from a battery, but what really matters in actual practice is whether any remaining hum is perceptible; if it isn't, then the mains-driven set can be regarded as perfect from this point of view.

There is another point I should like to mention about directly-heated and indirectly-heated mains valves, and that is the question of their relative characteristics. You will often find that the anode-current/grid-bias characteristic of the indirectly-heated valve is more curved than the corresponding characteristic for the directly-heated type.

This means that if we take two valves representing these two classes and having the same impedance and the same amplification factors, there will be a difference in the maximum power output, the directly-heated type, other things being equal, actually having a greater possible power output.

Pick-up Adjustments.

I don't know whether you've noticed that pick-ups are not always properly adjusted as regards the position of the armature and needle. I was examining a pick-up the other day which was very badly out of adjustment in this respect, the armature being quite to one side, so that it was much more inclined to move in one direction than in the other when vibrating.

I have not used this particular pick-up long enough to know what its effect on records may be, but one would imagine that, inasmuch as the track on the record is fairly symmetrical about the mean line, this lopsided pick-up would tend to damage the track on that side on which the needle was difficult to move. It is worth while to overhaul your pick-up from time to time to make sure that the movement is quite free and that the mean position of the armature is really the geometrical mean position. At the same time, you should make certain that the armature is quite free to move and that no dirt has become lodged in such a position as to obstruct it.

Needle Clearance.

When the pick-up is enclosed in a metal or bakelite cover, as many pick-ups are to-day, you might think that this question of the entry of dust would not arise, but as a matter of fact it is just in those cases that I have found the danger to be greatest.

In one pick-up in particular which I use frequently the needle-holder emerges through the metal cover with an extremely small clearance around it, and more than once I have found this clogged up with fluff, presumably due to particles of hair and dust being thrown up from the record and possibly also due to occasional wiping over of the pick-up and adjacent parts with a duster.

Low Frequency Oscillation.

Talking about pick-ups, by the way, you will often find that a high-pitched whistle is produced when you touch any part of the pick-up; sometimes, curiously enough, this whistle occurs when you do *not* touch the pick-up, and ceases or is reduced when you touch it. This kind of thing doesn't usually happen in a commercially built radiogram, but is more likely to happen in a home-made or experimental layout, and particularly where long leads run from the pick-up to the amplifier.

It can usually be entirely overcome by connecting an earth wire to the metal cover or to some integral metal part of the pick-up. A convenient way of doing this is to connect the pick-up electrically to the tone-arm or pick-up arm, the latter being in turn connected to earth.

Whistling Pick-ups.

Even if the whistle is only slight, or is not noticed at all, it is still well worth while trying the earthing dodge mentioned above, because you may be getting distortion without the actual interference of the whistle. A properly earthed pick-up is very much easier to handle and much more stable in operation.

Incidentally, the pick-up leads should never be any longer than can possibly be helped, and, if the tendency to oscillation is very bad, it may even be necessary to wind a piece of earth wire around the pick-up leads so as to form a rough shield, or to use metal-sheathed flex, as is done in many commercial radiograms. Remember, however, that the pick-up is in the grid circuit, and earthing and shielding here (as elsewhere in the circuit) means a certain loss in sensitivity, so you should not go to the other extreme and overdo things.

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

Troublesome Switches.

What a lot of trouble can be caused by an insignificant little component like an on-and-off switch! Many switches in use to-day have a blade or plunger which can turn on its own axis: that is, if you turn the knob, you turn the plunger at the same time. If there is the slightest particle of dirt or grit between the plunger or the leaves you get all sorts of crackling when the switch is touched.

A week ago I had a lot of trouble with a set, not owing to crackling so much as owing to the set sometimes going completely off. Of course, the switch was suspected, but as soon as it was examined it behaved itself perfectly, and in that way disarmed suspicion!

After endless trouble with different parts of the receiver, including frequent examination of the fuse (it was a mains-operated set), I came to the conclusion that it must be the switch, and on taking this out and readjusting it the set worked perfectly, and there was no further trouble.

It seems rather ridiculous that all this annoyance can be caused by what ought to be a simple, straightforward component like an on-and-off switch. Some makers are now putting out switches in which the actual plunger is not cylindrical, and cannot rotate. This design strikes me as much better.

Certainly it seems that when you fit a simple thing like a switch you ought not to have to worry as to whether it will do its job or not.

Radio in Industry.

I daresay that you know that high-frequency alternating currents—often produced by valve oscillators—are used for an increasing number of industrial and other purposes, altogether apart from their uses in radio. One of the best known of these uses is in the small electric furnace.

An interesting development in this connection has recently been made in connection with the hardening of steel. It has been known for a long time that if steel is treated in certain ways with nitrogen, so that the surface layers of the steel form a compound with the nitrogen, the steel is case-hardened.

The methods which have hitherto been used, however, only produced an extremely thin case-hardened skin. It has now been found that by the use of high-frequency oscillations during the nitrogen treatment, the nitrogen can be made to penetrate to a skin depth of as much as 20 to 30 times as great as the former process

So that although the steel is still

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

case-hardened or skin-hardened, the "skin" is very much thicker.

How Does It Work?

It's funny what curious things interest people sometimes. A little while back I mentioned in these Notes something about a reader who had "discovered" that a wire connected to the grid of a valve and allowed to trail in the groove of a gramophone record would enable the sound from the record to be reproduced through the wireless set. I said that this was all news to me, and that I would like to know anything which readers could tell me about it.

I have had quite a lot of letters from readers, some of whom say that if you use an ordinary acoustic gramophone and connect the needle by means of wire to the grid of a valve you will get the same result. Another reader ventures an explanation which is roughly as follows:

A Reader's Explanation.

He says: "The gramophone record is made of material of high-insulating properties. If such a substance is rubbed, static electricity is generated. Therefore the wire in passing along the grooves generates static charges corresponding to the recorded sound.

"These charges may be very small, but nevertheless, sufficient to cause changes in the grid circuit. If an ebonite panel is rubbed, and the tags of a pair of headphones are passed over the surface, clicks will be heard in the 'phones for similar reasons."

I can understand about the clicks in the headphones due to the frictional electricity on the ebonite panel and this, in fact, is well known. But all I can say about the wire in the record track is that I tried this out and was unable to get any result!

Stabilising Condenser.

To obtain stability in a set it is often an advantage to connect a condenser across the power valve; this has the effect of cutting down the high frequency passing through the loudspeaker leads, and in addition it tends to lessen the strength of the upper tones, which is often a good thing. A suitable value of fixed condenser is ·001 or ·002 microfarad, and this should be connected from filament to anode.

Remember that this condenser may be called upon to withstand fairly high voltages; this is true even with a battery-operated set and even more important when a mains-unit is used, because the voltages may be sometimes much greater than the usual operating value. If a breakdown should occur in the condenser it may cause a short-circuit of the supply which, of course, would be a serious matter.

When a Condenser Becomes "Groggy."

It is true that if a condenser is getting "groggy" you will probably have warning of this by reason of crackling and other noises, so that you need not wait for a complete breakdown to take place. There are, unfortunately, a number of cheap and very inferior fixed condensers on the market, which are not given any reliable test at all, and it pays to give a little extra for a fixed condenser and get one which is tested for a good safety margin.

G.B. with Mains Valves.

When using mains valves it is very important—contrary to the impression which many people seem to have—to use grid bias, and this of the correct value. I have several times found that trouble has occurred in mains sets due either to an improper value of bias or to no bias being used at all. This applies particularly to the screen-grid valve.

If the bias applied to the valve is less than a certain amount, which is usually round about 1-volt negative, grid current will be allowed to flow, with the result that the tuning will be broadened and the amplification of the valve will fall below its maximum value.

Impedance and Magnification Factor.

The bias to be used, of course, depends very greatly upon the type of valve which is used and also upon the screen-grid and anode voltages. Generally a bias of about 1 to 1½-volts negative will be sufficient, though in some cases this may go as far as 3-volts negative.

If the bias is increased, the effectiveness of the valve is lessened, and although in some ways this is a disadvantage it has the corresponding counterbalancing advantage that the set may be rendered more stable; if there is a tendency to instability this is a point which is worth bearing in mind.

If you wish to increase the bias for any reason and want to avoid the consequent interference with the impedance and magnification factor, you can sometimes, not always, do this by increasing the screen-grid voltage.

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