

SIMULTANEOUS BROADCASTING—By CAPTAIN ECKERSLEY

Popular Wireless

Every Thursday
PRICE
3d.

No. 399. Vol. XVI.

INCORPORATING "WIRELESS"

January 25th, 1930.

The REJECTOR CRYSTAL SET

See Inside



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When
Currents Spill Over
The Secret
of the Insulator
The Life Story of
Albert Sandler
Bother With
The News Bulletins
etc., etc., etc.

EVER READY



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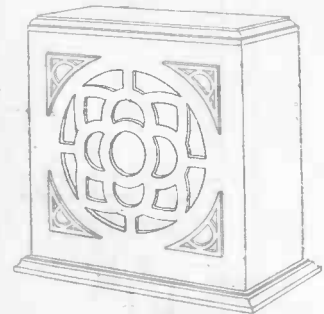
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THE FIRST AND GREATEST
NAME IN WIRELESS



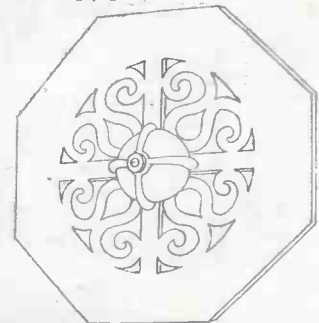
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"P.W." BLUE PRINT

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3. 1-VALVE L.F. AMPLIFIER.
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5. H.F. (Tuned Anode) AND CRYSTAL WITH REACTION.
6. H.F. AND CRYSTAL (Transformer Coupled, without Reaction).
7. 1-VALVE REFLEX AND CRYSTAL DETECTOR (Tuned Anode).
8. 1-VALVE REFLEX AND CRYSTAL DETECTOR (Employing H.F. Transformer, without Reaction).
9. H.F. AND DETECTOR (Tuned Anode Coupling, with Reaction on Anode).
13. 2-VALVE REFLEX (Employing Valve Detector).
16. H.F. (Tuned Anode), CRYSTAL DETECTOR AND L.F. (With Switch for Last Valve).
17. CRYSTAL DETECTOR WITH TWO L.F. AMPLIFIERS (With Switching).
18. 1-VALVE REFLEX AND CRYSTAL DETECTOR, with 1-VALVE L.F. AMPLIFIER, Controlled by Switch.
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34. AN H.F. AND DETECTOR TWO-VALVER.
35. THE "UNIVERSAL THREE" (Det. and 2 L.F. stages resistance-coupled).
36. THE "SPANSACE FOUR" (H.F., Det. and 2 L.F.).
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38. A TWO-VALVE L.F. AMPLIFIER.
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40. THE "SUPER SCREEN" THREE.
41. THIS YEAR'S "CHITOS" ONE-VALVER.
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47. THE "WAVE-CHANGE" ONE.
48. THE "REGIONAL" CRYSTAL SET.

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Number

2. A "HIGH POWER" FIVE (A powerful and selective five-valve set incorporating two high frequency stages).
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 5. THE "FULL-TONE" TWO-STAGE AMPLIFIER (A powerful two-valve amplifier using two transformer coupled stages).
 6. A "SIMPLE CHANGE" THREE. (A simply made but highly efficient H.F., Det. and L.F. with wave-change switching).
 7. AN "EVERY PURPOSE" THREE (A powerful Det. and 2 L.F. receiver with wave-change switching).
 8. THE "SIMPLE SCREEN" FOUR (A straightforward general purpose four-valver).
- Also THE "ECKERSLEY THREE" (A few blue prints of this famous circuit are available, price 1/-).

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TUNE IN WITH THIS



THE Watmel Double Range Tuner, which does away once and for all with coil changing, is the ideal tuner for the modern Radio Set. Shunted with two .0005 variables (one for reaction) it controls accurately and smoothly all waves on the bands

between 250 and 600 metres, and 1,000 and 2,000 metres. Change over is effected by a push-pull switch supplied with each tuner, and the price complete with switch and diagram of connection is

12/6

AND TUNE OUT WITH THIS



CONNECT this neat and attractive Watmel Wave Trap in series with your aerial lead, and you will be able to cut out

those troublesome unwanted stations with ease and certainty.

There are six possible positions for the two plugs in the four sockets, so that you can suit your own aerial conditions precisely, and tune out stations simply by turning the small micro condenser knob.

A combination of the Watmel Tuner and the Watmel Wave Trap assures you of the finest, most selective tuning possible to the Modern Radio Receiver.

The Wave Trap costs only 8/6

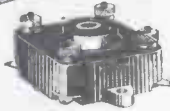
We shall be glad to send you on request our Folder No. 104, showing you how to make up a very fine Loud-speaker from a Kit of parts, also Folder and Blueprint for building up a modern 3-valve Set.

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The original anti-microphonic valve holder, often imitated, never duplicated.

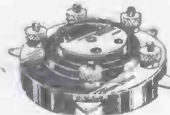
2/-



VIBROOLDER.

The self-aligning feature ensures positive contact with all 4-pin valves.

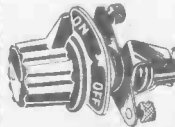
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5-PIN HOLDER.

For 5-pin valves with centre leg. Can also be used with standard 4-pin valves.

1/9



ROTARY SWITCH.

An effective alternative to the push-pull type. All insulated and with indicating dial.

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Whatever type of circuit you are building there are Benjamin components to suit your purpose. To those of you who are building portable sets, or gramophone amplifiers, Benjamin valve holders are essential, as the vibration and jolting in these two types of sets will not only give rise to unwanted noises, but may mean the complete breakdown of expensive valves. The patent anti-microphonic and self-aligning features ensure positive contact with all types of valves.

THREE MORE POPULAR COMPONENTS

PUSH-PULL SWITCH.
Double-contact and with terminals. It's "off when it's in." 1/3

TURNTABLE.
Ball-bearing and equipped with hinged and folding legs, enabling set to be used either in or outdoors. 7/6

PENTODE HOLDER.
The standard Clearer-tone model, with flexible attachment for terminal on pentode valves. 2/3

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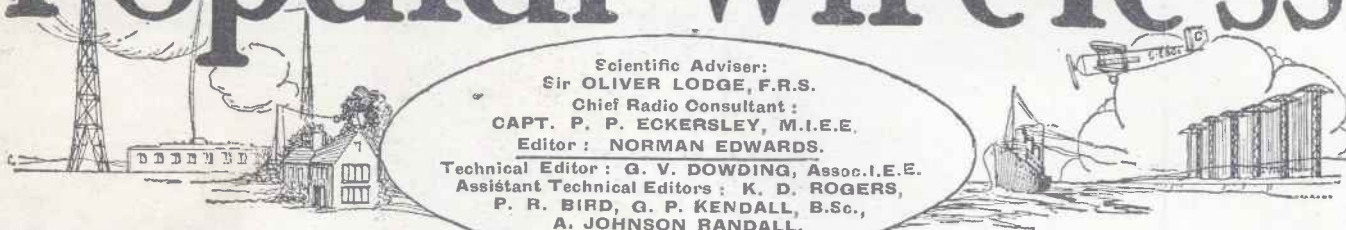
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Popular Wireless



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 Editor: NORMAN EDWARDS.
 Technical Editor: G. V. DOWDING, Assoc.I.E.E.
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SHIP TELEPHONY.
STEAM UP!
SHORT-WAVE NOTE.
WANTED—A SLEUTH.

TALKIE TONES.
THE RIGHT STUFF.
A WELCOME SIGN.
LOW HIGH-TENSION.

RADIO NOTES & NEWS

Ship Telephony.

A. G. W. M. (Middlesbrough) has always something worth telling us when he writes, and this time it is all about his stumbling upon telephony tests between the "Olympic" and Rugby. Wave-length, 24 metres; call-sign, G 2 GN; strength "tremendous," and quality "90 per cent better than transatlantic telephony." It would have been of interest to find the ship's position at the time, but I am sorry that our friend has sent me the longitude only.

Noughts and Voices.

ONE of these demon calculators has drawn my notice to what he says is the fact that as the power used by an ordinary person in speaking is reckoned to equal 0.0001 watt, it would take 12,000,000,000 persons to exert a power equal to that of Huizen, which is rated at 120 kw. This fiend went on to say that in spite of all those noughts the pressure on the eardrum of a man standing 10 inches from a L.S. delivering Huizen is only 0.000001 of an atmosphere.

And I'll bet if the L.S. were in Alabama the pressure could be puzzled out!

Steam Up!

ALL the way from Pietermaritzburg, Natal, comes a letter from J. F. C. to tell me that some time ago, during the construction of telegraph lines near that city, the workmen complained of heavy electrical shocks. As the lines were not "in circuit" the complaints were pooh-poohed, but the men continued to yelp, and an investigation showed that the steam from trains impinged on the wires and charged them statically to a nice high potential. Sad to think that as James Watt watched his historic kettle he could not see or imagine the electrons which were one day to supersede steam.

Short-Wave Note.

AS I have had a number of letters inspired by Mr. H. Hanson's on the subject of short-wave conditions, perhaps W. L. S. will allow me to invade

his province to the extent of one paragraph. H. J. K., A. W. M. and others confirm that at the end of last month night conditions were poor, and that newcomers to short-wave work should not, therefore, suspect their sets.

A. W. M. says he finds that day and night conditions are seldom poor at the same season, and he recommends day work as a change. This will keep you indoors during week-ends, and prevent you from breaking your collar-bone at football.

A Warning.

THE invisibility and apparent intangibility of electricity is probably the cause of its attractiveness, especially in radio work. I knew a man who began as a radio amateur, and who used to say

"ALL FARES, PLEASE(D)!"



Paris taxi-men are famous the world over, but this enterprising individual has stolen a march on his fellows by installing radio in his taxi. He just "pressa de butt," and Voila! Ici Radio Paris!

that he was fascinated by "doing something with nothing." Just a wire in space and an unseen power in the circuits. He took up electrical engineering as a profession, when he should have learned that electricity is a real thing. However, his familiarity bred contempt, and he rashly crawled in amongst some high-tension circuits on a wireless station without first shutting off the power. His grave in a far-off land

should be a warning that "nothing" can kill.

Wanted, a Sleuth.

I HAVE by now analysed all the letters which were sent as a result of the paragraph which appeared under this heading in "P.W." for December 28th, an astonishing number, whose writers I must hereby thank collectively. Most of them seemed to think it an idle inquiry, and said, in effect, "Why ask such kindergarten stuff?" Very good! Here are the results summarised. C. W. E. can take his choice. All one price.

The Mystery Solved.

THE station heard by C. W. E. was Turin, Milan, Leipzig, Barcelona, Toledo. Its wave-length was 294, 291, 291.1, 274, 259 metres. It was relaying 2XAF. The announcer is a man, a woman. The bird is a nightingale, a canary. The bird-call is whistled by the man, by the woman; it is broadcast from a gramophone record. Let us say, therefore, that it was Turin on 291 metres, relaying WG Y, the announcer being a woman, the bird a nightingale, and the bird-call from a record. Even then, some of the other reports may be correct, for Turin has not a monopoly of U.S.A. relays!

Dr. Ferranti.

IN the first month of 1930, and sadly enough in Radio Week itself, Britain lost by the death of Dr. Ferranti one of the world's most famous electrical engineers. His name was known to every wireless enthusiast in connection with our great hobby, but he was famous long before

his firm's activities in radio as "The Man Who Lit London."

This early triumph was followed by many others, and in 1924 he was awarded the Faraday Medal, the highest honour conferred by the Institution of Electrical Engineers. Dr. Ferranti died at Zurich on January 13th, after only a few days' illness.

(Continued on next page.)

NOTES AND NEWS.

(Continued from previous page.)

An Alleged Record.

REPORTED from the States that by listening-in for more than five days an American lady has set up a new championship. Now, there are all sorts of panto jokes arising from this, but I think that they are mostly based on the unwarranted assumption that the fair one listened only. Had she done that the feat would, of course, be superhuman; but such is not her claim, and I am of opinion that she maintained a running argument with every person who appeared at the mouth of the "mike" and beat the "woild."

"Talkie" Tories.

THAT reminds me! I have been trying to foster a real liking for the "talkies," and so far have failed. The films are quite as good as the rest; the technical part (synchronisation, etc.) is well done; the perfume squirted into the smoky atmosphere is pleasant. And yet—it's that terrible American, drawling, slurring, slangy way of speaking. To hear a dainty-looking maiden say, "Yup! That's okay with me! But, SAY! Don't put yourself out any" is like toothache. And why do the Americans represent their middle-class family life as being so noisily vulgar—in defiance of the truth?

"I Did But Hear Her."

THIS strikes a pleasanter vein. The story goes that, after hearing Miss Gwentyth Edwards broadcast, three men wrote to her, proposing marriage. Tweet, tweet! Very pretty! I am glad to know that there is still enough romance in the male soul to cause men to do things like that. What nerve those three fellows possess! Though, now I come to reflect, I believe if "Auntie —" were not so unapproachable, her voice would probably charm the social pen into my hand. Would she answer "Yeah"?

Transmitting Item.

MR. E. W. HERON, 60, Alexandra Park Road, Muswell Hill, N.10, asks me to announce that he transmits on the 170-metres wave-band, using an artificial aerial. His call-sign is G—2BIL, and the power is 5-10 watts. He is particularly interested in crystal control and high-frequency amplifiers. E.W.H. adds that he has logged more than 30 medium-wave stations by means of the "Magic" Three. We are not surprised. That set is almost capable of keeping the log-book entered up.

Why Not Learn Morse?

THAT would be quite a good thing to aim at during 1930. The ability to read the Morse code adds greatly to the interest of "listening," and may on occasion be very useful. Don't forget that by being able to follow the messages sent out by the Russian vessel, "Jakov Sverdllov," when it was in trouble in the Channel, a Surrey man was instrumental in sending assistance to it. Hearing no replies to the S.O.S., he telephoned to the North Foreland wireless station, and very soon official communication with the ship was set up.

The Lucky Society.

THE Muswell Hill and District Radio Society (Hon. Sec. Mr. C. J. Witt, 39, Coniston Road, Muswell Hill, N.10), whose syllabus for the first quarter I have received, seems to be unusually favoured. Its President is Captain H. J. Round, M.C., and amongst its honorary members I see the names of Mrs. H. J. Round and Captain P. P. Eckersley. The syllabus has been arranged with skill and should attract every amateur in North London.

Good News.

I AM very glad to learn that Mrs. S. G. Brown is now well on the road to recovery from her recent illness, and, in fact, is to-day embarking on a convalescent cruise. Bon Voyage!

SHORT WAVES.

Jones: "How's your new multi-valve set going, old chap?"
Brown: "It's improved wonderfully, thanks. We ought to be able to hear something soon."—"News of the World."

There was a long breakdown on the wireless recently. Many listeners imagined that it was one of the "My Day's Work" series by a Civil Servant.—"London Opinion."

Mother: "Little boys who turn on the radio on Sundays will never go to heaven."

Father (overhearing): "Little boys might, but it makes it impossible for grown-up fathers."

"A service was broadcast from the gaol at Columbus, Ohio. The prisoners formed the choir," we read in the "Universe."
It was probably a howling success.

Persevering Salesman: "Yes, sir, we sell our wireless sets by the dozen."

Fed-up Customer: "Um! that's not surprising. How much are they a dozen?"

"Why go out to dance halls and picture palaces? Buy one of our wireless sets and spend your evenings comfortably and QUIETLY at home," runs an advertisement in a daily paper.
Quite, quite!

"—AND THE PARROT SAID."
"A Gracie Fields gramophone record, 'Scented Soap,' played the other Friday, concluded with 'I think I'll go and have a bath now.' Our parrot, an attentive and apparently an appreciative B.B.C. listener, added: 'Ta-ta, love!'"—"Liverpool Post and Mercury."

NOW THAT THE SALES ARE HERE.
Some suggestions for broadcast items:
1.50.—Tone Poem. "The Bargain Basement."
N.B.—Sensitive listeners are advised to wear cotton wool for this item.
2.15.—First Aid Talk by Dr. Lint. 1. Antiseptic bandaging of poisoned cuts and scratches
2. The removal of fragments of cloth, umbrellas, or other foreign bodies from incised wounds.—"Daily News."

The Right Stuff.

A TALK after my own heart was the one broadcast from the Scottish stations, by Mr. Alexander Macdonald, F.R.G.S., all about his recollections of Jack London, that writer who lived so many of his own stories. Mr. Macdonald met London in the Klondyke, and it is said that the stories, "The Call of the Wild," and "White Fang" were inspired by Macdonald's dog-team. The speaker has been globe-trotting since he was nineteen and reckons that he has travelled 1½ million miles.

A Welcome Sign.

THE U.S.A., than whom no greater promoter of jazzery in music has existed, appears to have experienced a change of heart. First, the National

Broadcasting Co. has, with two music publishers, formed a company whose object is to get better music "on the air." And now I see it announced that the U.S.A. Federal Radio Commission has issued a regulation requiring broadcasting stations "to announce clearly and distinctly the character of all mechanical reproductions broadcast by them." So now the listening Yank will know whether Rachmaninoff or a gramophone is performing!

How Do You Listen?

DO you dial around generally and take "pot luck," or settle on your station and items by reference to published programmes, or do you just tune in "the nearest" and go to sleep? On enquiry by a Chicago station it was found that by far the greatest number of people referred beforehand to printed programmes—obviously the most sensible way; 20 per cent used lists which they themselves had made up; 1 per cent went straight to a favourite station and stayed on that adjustment, and 4 per cent merely fiddled around and hoped for the worst.

Better Than Theremin?

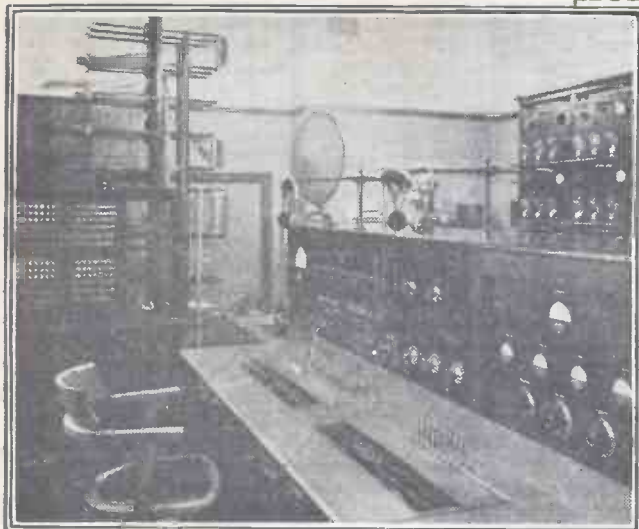
GOING what looks to me one better than Mr. Theremin with his hand-played oscillating circuit, Dr. S. Franko, a Hungarian, is reported to have invented what he calls a radio piano. Details have not yet come my way, though I understand that the principle of the invention is the variation of the "beat" note of two oscillating circuits by the action of steel on the current passing through certain coils, the pieces of steel being moved as the keyboard is operated in the usual way. The value of this device is not obvious, and the disadvantages of such a "piano" as compared with the ordinary kind are patent.

The Census and Trade.

I HAVE seen recently a short and unobtrusive paragraph to the effect that one of the questions to be put to citizens of the U.S.A. in a forthcoming census is, "Do you own a radio set?" A simple, chatty little enquiry—prima facie. Now, this is either a sign that the U.S.A. are definitely radio-crazy or else a Machiavellian plot on the part of manufacturers of receivers, who would find a list of non-owners most useful for canvassing purposes. Suppose our own census paper asked, "Have you a gramophone, a safety razor, or a lawnmower!"

Low H.T. Voltages.

THE correspondence which we are receiving about unusually low anode voltages for receiving valves reminds me that during the war I had a "peach" of a soft valve which would do almost anything except recite the "Green Eye of the Little Yellow God." One day I reduced the H.T. voltage until I found that I was using one 4-volt dry battery. I then broke open the battery and connected to two of the component cells, which would give a total of about 2.7 volts, and with this signals from Tsarkoeselo, near St. Petersburg (Leningrad), were strong. It was certainly a powerful station, and the wave would have been long. But you couldn't call 2.7 "high" tension, could you?



SIMULTANEOUS BROADCASTING

BY CAPT. P. P. ECKERSLEY M.I.E.E.

(Chief Radio Consultant to "Popular Wireless.")

The transmission of a programme from more than one station at the same time is an important part of our broadcast service. Why, therefore, should we not have alternative relay routes in case of breakdown?

THE new London station was effectively put out of action for a few hours as a transmitter of worth-while broadcasting owing to the failure of a cable circuit. This fact makes one wonder if, after all, we have been right to base future development on the use of telephone cable circuits for interlinking far-distant stations. What is the future of S.B.? What technique must prevail? Can we perhaps use more wireless link?

The statement of the problem is simple. Under any scheme of broadcasting it is essential at some time or another to be able to connect some or every transmitter of a system to one common source.

The American System.

Thus, in America, one hundred stations, the furthest apart separated by, perhaps, 3,000 miles, can be simultaneously energised from the same microphone. About 30 European stations have, on an occasion transmitted the same programme; in Britain we are familiar with the phrase "S.B. to all stations" (incidentally, if S.B. means simultaneously broadcast, what is the word "to" doing?).

It is obvious that we must possess this facility, otherwise much of the interest in broadcasting fails. The local station is only so called because it is necessary to give strong signals to a locality, not because it always radiates local programmes.

I can imagine the most rabid provincialists feeling themselves very aggrieved if they never got the national news, Sir Walford Davies, or the Queen's Hall concerts, all of which come to them via a landline from London, and are only radiated by their local station. Also, when Europe gets better interlinked the interest in the programmes is bound to increase.

Three Main Methods.

These are the three main methods by which stations may be linked to a common microphone. Firstly by the overhead telephone wires, secondly by cable, and thirdly by wireless.

The disadvantage of the overhead line is its vulnerability; its liability to be broken down by storms, or what are called the "acts of God" (i.e. happenings that no reasonable man could expect to take place).

There is a further disadvantage in the

use of the overhead line, namely that physical considerations impose the necessity of its being non-homogeneous. For instance, you cannot have overhead lines in large cities, they are rightly forbidden by the municipal authorities.

Thus, even if the overhead part of the lines on a long route were all of the same diameter wire (which is by no means the case) the circuit would, of necessity, periodically change its characteristics, and so bring about unwanted "reflections" and bad quality. It has always been said in the past that the cable circuit is far less vulnerable than the overhead line.

The cable circuit is buried in the ground. Actually it runs in ducts made like drain pipes, so wind and rain and falling trees, and other little local cataclysms leave it stable and undisturbed. But that is not to say it is invulnerable—floods, subsidences, earthquakes, and all movements of the

service, or if the transmitter is high-powered enough one can find neither the money to pay for them or the ether in which to accommodate them.

Short waves are too tricky yet, especially for use over distances of hundreds of miles, for serious consideration. Besides which it is indefensible to use short waves so valuable for world communication for short-range service.

So we return to the cable, seeing in it the advantages of greater reliability and of homogeneity, but the disadvantage of not being quite immune from failure and upon failure comes long periods between break and remake.

Effect of Floods.

The last disadvantage is very serious. I am not sure of my facts, but I suppose that during the recent floods communication by cable to the west on certain routes has been quite impracticable, and may remain so for a long time.

If, in ten years' time, all overhead lines are abandoned, and if broadcasting is still going on, such floods might result in serious dislocation to the service unless we can foresee how to overcome the trouble.

Now in this article I am merely trying to think aloud, survey the position, and indicate possible solutions. I am not being in the least dogmatic, nor do I say that for a moment my proposed solutions are any more than worth some study. I have not discussed the question either with the B.B.C. or with the Post Office, and I am quite

likely not in possession of all the facts.

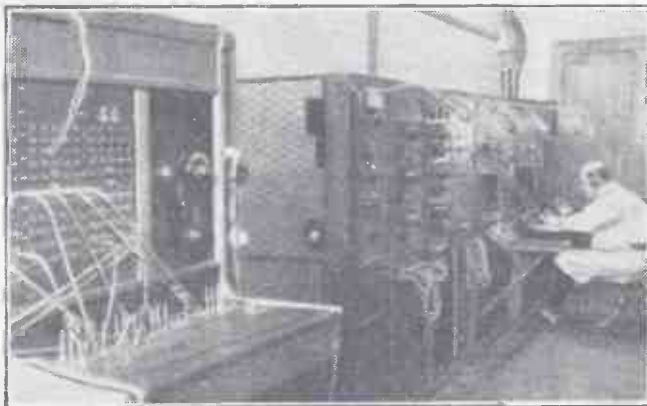
I do suggest, however, that for long-distance S.B. the ideal is to run overhead cable, thus keeping the advantage of homogeneity and of quick repair, and yet greater reliability.

Overhead Cables Best.

I suppose that it is by no means silly to suggest that what has been done in America might have been done here, and that as we have some of the finest pole lines in the world, they might have been

(Continued on next page.)

PROGRAMME EXCHANGE AT PRAGUE.



To the left of this view of the central control-room at Prague, the S.B. board for the Czech stations is shown.

ground, may spoil the delicate balance of the circuits, or break them down completely.

And it is important to appreciate that when a cable fails by any of these causes it fails properly and may be out of action for weeks where it is flooded, and for days where earth movement breaks it. You may have protected your circuits by burying them, but in consequence they are much more difficult to get out for repair.

As to wireless, one may, except in a certain number of limited cases rule this out altogether. Long waves are attached to too much by atmospherics for reliable

SIMULTANEOUS BROADCASTING.

(Continued from previous page.)

readily adapted to the purpose of carrying the cables away from the influence of flood and earth movement.

In large cities we must take the risk of underground lines, and, after all, we have run all our local broadcasting for years on this principle and have had only one big failure. In the country districts the overhead cable might be just that more vulnerable but also just that quicker reparable.

But all this is very academic because these lines do not actually exist; the Post Office have adopted the underground technique and the cost of their installation is far beyond the financial resources available to the B.B.C. The Post Office cannot study a special appropriation for the B.B.C.

An Expensive Business.

The broadcasting authorities must pay in revenue or capital for what they use specially for broadcasting, but S.B. is, in fact, only possible because the overhead charge of establishing a telephone network (a small part of which happens to be available for broadcasting) is really paid for by the ordinary telephone subscriber.

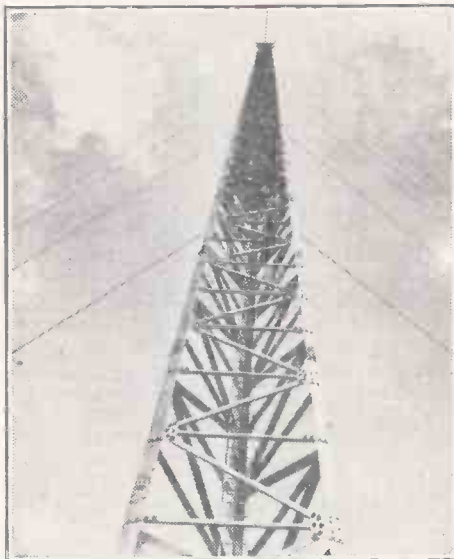
The only real solution appears to me to be to put up a cable S.B. system which is permanently equipped with alternative routes as distinct from alternative circuits. If a cable route breaks down all circuits on that route go out of action.

Thus, in principle, a London-Newcastle link, for example, is normally established by an east coast route, but arrangements could surely be made to have an emergency route via Manchester, and then across.

London-Cardiff might be normally via Gloucester, but alternatively through Birmingham and, say, Bristol. I don't know

my facts as to exactly how the circuits run, but the principle is surely clear. I do not suggest that the B.B.C. should have to pay for such routes, I suggest they should be available for change over when a disaster (which is really the Post Office's responsibility) occurs.

There is another question, that of the suitability of cable circuits for broadcasting. Not every cable circuit is suitable, because



The top of one of the giant masts of 5 X X, which is our most important S.B. station, and generally takes the London programme.

they cut off the higher frequencies. Thus, cable circuits have to be treated specially before they can be used for broadcasting purposes, and this treatment is very expensive.

It is possible, if the Post Office are out to help the broadcasting service and the B.B.C., to meet the cost of altering one set of cable circuits; but on my "alternative

route" scheme the cost would be perhaps too great. One must, therefore, and for the time being, be prepared either to suffer cut-off, or adopt an alternative overhead route.

I am, as a matter of fact, still wedded to the idea of cable circuits for broadcasting; on the one hand, because I think S.B. is the worst feature of the technical side of broadcasting to-day, upon the other, because recent broadcasts from the continent have shown how good it can be.

American experience teaches us that 3,000 mile interlinks give first-class quality, but, I believe, only because it is essential to have homogeneity of circuit characteristics.

Depends on the Post Office.

The B.B.C. has its hands tied if it cannot look for the largest measure of co-operation from the Post Office. If the Post Office looks into the matter as a purely business speculation we are likely to have a poor S.B. service for a long time to come, and the B.B.C. must face facts and reconsider its policy of centralisation. If, on the other hand, the Post Office realise that millions of people are waiting for a better S.B. service, that they must take a large view, there is no reason to bring up any technical arguments against centralisation. These ought to be unnecessary anyhow, however!

TECHNICAL TIPS.

A carpenter's brace can often be adapted to take a small wireless drill if necessary by winding a fairly stout wire around the drill in the form of a spiral spring, to enlarge its diameter.

A light smear of oil, followed by a polish with a soft, clean duster, will often restore an ebonite panel that has gone "off colour."

If the field of a moving-coil loud speaker is to be provided from D.C. mains, it is generally quite unnecessary to use smoothing apparatus for it, as the mains can be connected direct to the field winding.

SERIES LOUD SPEAKERS.

If you have several loud speakers in series working together, remember that any one can be switched out at will by connecting an ordinary on-off filament switch across its terminals.

Ordinary coil plugs and sockets make quite good loud-speaker extension connections, the sockets being mounted upon the skirting-board and the plug attached to the lead of the loud speaker.

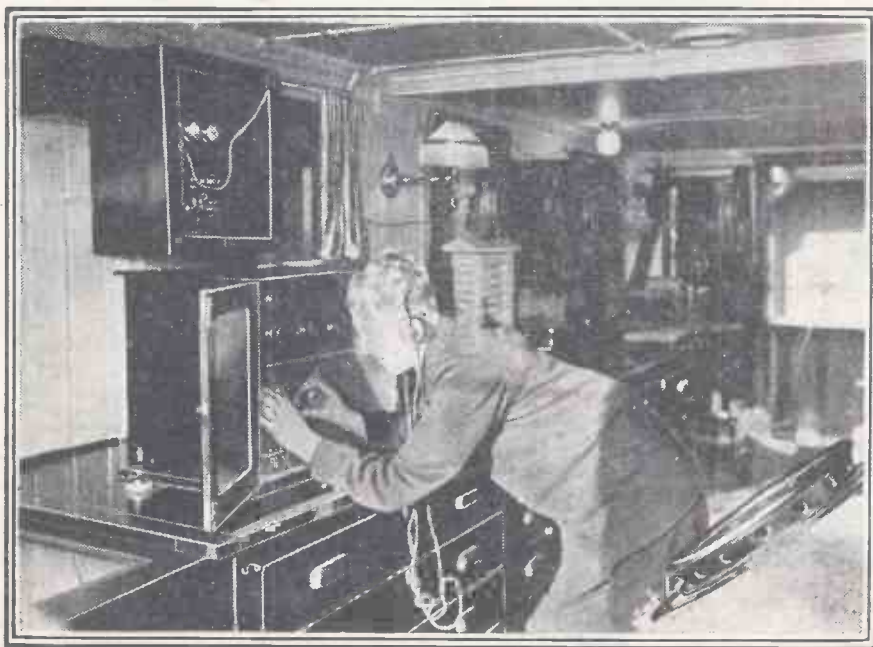
Ebonite panels should not be stood on end against the wall, but should be laid flat on a level surface.

If you find that an abnormally heavy plate current is being taken by valves with normal grid bias, the insulation of the coupling condensers can be suspected, as it is possible that high-tension leakage across this point will nullify the value of the grid bias to some extent.

Never allow an L.T. battery to stand idle for several weeks, but take it to the charging station so that it can be given an occasional charge.

Hum from a mains unit can sometimes be overcome by connecting two large and thoroughly sound fixed condensers in series across the mains and earthing the centre point.

WIRELESS IN ANTARCTIC EXPLORATION.



The research ship "Discovery II," which is to explore the Antarctic, is well equipped with radio. Above we see a view of the wireless cabin which is naturally one of the most important sections of the vessel.

LIFE STORIES OF FAMOUS BROADCAST STARS N°9.



HOW THE WIRELESS HAS HELPED ME

by ALBERT SANDLER

The famous violinist adds his story to our series. It is a very romantic one, and tells of his steady rise from the poorest of surroundings to his present fame.

POVERTY is ambition's greatest enemy. No matter how rich or how poor we may be, there usually comes a time when we feel that just that extra little bit of money might mean all the difference between success and failure in life. And when I look back on my early days, I still think it half a miracle that I was able to raise myself from gloom and squalor in the East-End of London to the comparative luxury and comfort which I now enjoy.

Not that I am rich by any means, but I am young, happily married, and have a good home. I have captured much of the happiness which life can give, and, although my greatest ambition is not—and, I fear, never will be—realised, there is much for which I can be truly thankful.

A Musical Family.

My parents were extremely poor, and the home into which I was born in the East-End was in keeping with their tiny income. Luckily, ours was a musical family. This gave us a real interest in life, and helped to counteract the deadly influence of our surroundings. My first musical effort was confined to drumming on the doorstep of our home, with two rough pieces of wood to serve as drumsticks. The neighbours occasionally threw me knobs of sugar, but whether these were intended as encouragement or as a deterrent, I do not know.

My eldest brother was a violinist, and did a certain amount of semi-professional work at weddings, dinners, and similar functions. His playing fascinated me, and I, too, determined to become a violinist. I begged my father to let me learn, and became so persistent in my demands that he finally gave way. By some mysterious means he scraped together sixteen shillings, which was sufficient to buy me a three-quarter size violin. He must have sacrificed several of his own little comforts to get this money; had he not done so, I might still be living in poverty. The splendid Stradivarius which I purchased recently cost £1,500, but the memory of my first violin and of my father's generosity still remains.

Series of Shilling Lessons.

My brother undertook to teach me the rudiments of music, but I fear that as a teacher he was not a success. I have never quite decided whether it was he who was lacking in patience, or I in intelligence. "That's not right, fathead!" he would say, as I blundered through an exercise. And, as if to add point to his remark, he

would clout me on the ear. My progress under such tuition was slow, and, after a short while, I asked my father if I might have another teacher.

To this he agreed, and I took a series of shilling lessons from a man who used more humane methods of teaching. I made such rapid strides that after a few months I went to a more advanced teacher.

When I was twelve, I was offered my first professional engagement. This was in a cinema orchestra for which I played after school hours. Needless to say, I regarded this as a distinct step forward, for I was anxious to obtain every bit of experience I could. As a start, I was paid five shillings



Sandler uses a Stradivarius violin, which cost him £1,500.

a week, and this helped to defray the cost of my lessons. I got on so well that shortly afterwards I was promoted to leader of the orchestra.

And then, one wonderful day, I awoke to find that I had been granted a scholarship at the Guildhall School of Music. I attended the school for two and a half years, taking lessons under the late Alfred Gibson. When I left, I became sub-leader in the orchestra at Maison Lyons,

Oxford Street. This position I held for one year, but when the new Coventry Street Corner House was opened I signed a contract for three years as orchestra leader. From Coventry Street I moved to the Trocadero Restaurant.

Improving Technique.

All this time I was taking lessons and gradually improving my technique. For a while I was under Hans Wessely, and later went to the wonderful Kalman Ronay. Much of the success I have achieved has been due to the care and patience with which Ronay taught me. I made rapid strides under his tuition, and am more than grateful for the painstaking way in which he imparted his great knowledge to me.

Nor must I forget the help, sympathy, and advice which I have received from the lady who is now my wife, and who was formerly Miss Raymonde de Mery. I feel that it is only fair that the public, who have been kind enough to say some nice things about me in the past, should know of the wonderful way in which these two people have encouraged me in my work, and my sincere thanks are due to the Editor of POPULAR WIRELESS for giving me the opportunity of making known these facts.

But to return to my story. When I was playing at the Trocadero, I was heard by a director of the Grand Hotel, Eastbourne. He immediately offered me the position of orchestra leader at the Grand when my standing contract expired.

A Tribute to Wireless.

My movements since that time are common knowledge amongst wireless listeners. I made my first broadcasts from the Grand Hotel, and these proved very successful. When I first went to Eastbourne, I did not know a soul, and, in a manner of speaking, I had to start life afresh. However, I soon settled down happily in my new surroundings, and I count the three years I spent at Eastbourne amongst the happiest of my life. Like most artistes, it was my ambition to settle down in London, but when I left the Grand Hotel for my present headquarters, the Park Lane Hotel, it was not without a pang of sorrow.

I have received hundreds of letters from listeners, many of whom seem anxious to know the type of man I am. Invalids and cripples write to me to say that my playing has helped them. This is a pleasant tribute, but it is a greater tribute to the wonderful work which wireless is doing.

THE CASE FOR EMPIRE BROADCASTING.

Should the British listener provide programmes for the Dominions and Colonies? A vital question which is viewed from both sides in this trenchant article.

By THE EDITOR.

OUR readers will probably remember an article we published in our issue for October 19th, entitled: "Home Listeners First." In that article we expressed the view that the licence money paid by listeners for a broadcasting service in this country should not in any way be diverted to provide a short-wave broadcasting service, unless some reciprocal arrangement were made with other parts of the Empire whereby listeners in this country could also receive regular short-wave broadcasting programmes.

Dominions Must Reciprocate.

We have had many letters on this subject and, judging from them, we should say that our readers are fairly sharply divided on this question of Empire broadcasting. Some readers write and accuse us of lack of interest in the Empire—most of these letters are from the Colonies; while other readers write—and these are mostly listeners in Great Britain—agreeing that licence money should first of all be spent on giving a first-class British Service, and that listeners should not pay for the upkeep of a short-wave broadcasting station unless definite arrangements are made to return the service.

We now understand that the B.B.C. is going to investigate thoroughly the idea of a permanent short-wave transmitting station by which the Colonies and Dominions will benefit. This station, if it is built, will take the place of the present Experimental Station at Chelmsford, which is hired by the B.B.C. from the Marconi Company.

Incidentally, we would point out that this is a business arrangement between the B.B.C. and the Marconi Company, and the fees for the hiring of the station are therefore paid for out of the licence money provided by British listeners in this country. A rumour was current a little while ago that tenders had been invited for the construction of the station, but we understand that this is not so, and only a preliminary report of the functions that such a station might be expected to fulfil has been drawn up.

It is two years ago now since 5 S W began short-wave transmissions. It never really claimed to provide a regular short-wave programme broadcasting service, and the situation has always been rather clouded as to the exact status of 5 S W. It is generally regarded as experimental.

Government Backing?

Letters from listeners overseas relating to 5 S W seem to indicate that 5 S W is received very irregularly; in fact, in some parts of the Empire 5 S W has never been heard—and criticism has been levelled at the B.B.C. on this account.

However, in this case the B.B.C. cannot be blamed. But when a permanent short-wave station is erected—which we hope it

will be, with Government backing—then proper arrangements could be made for the broadcasting of regular programmes after midnight, so that all parts of the Dominions and Colonies could receive them.

Probably the station will be based on the Beam system. But it may definitely be taken for granted that no part of the licence fees contributed by British listeners will be used for the purpose of building this station. The B.B.C. has made it quite clear that it has no fund to provide for the maintenance of such a new station; it is

encouragement of overseas listeners in the Empire to purchase sets other than British. This, we think, is rather stretching the point. But if our correspondent is right in saying that there is not one British listener who would regret paying 10s. a year, and more, to hear Big Ben and the British programmes, then we suggest that listeners in the Colonies and Dominions should get together and make real representation on these lines.

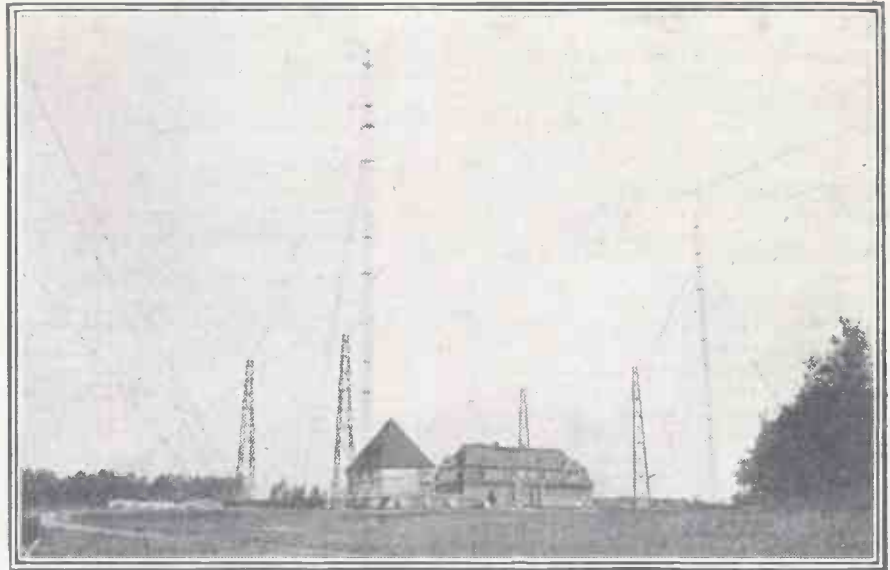
Why Not a Colonial Fund?

After all, all we ask in the Home Country is that if we provide a regular short-wave broadcasting service for listeners in the Colonies and Dominions, they should reciprocate and make arrangements to give us a regular short-wave broadcasting service.

We quite agree that wireless can do much to help the Empire in tightening the bonds between the Colonies and the home country, and we quite believe that overseas listeners are not asking for something for nothing.

Our correspondent from Nairobi says that listeners abroad have never been asked

THE AERIALS OF KOENIGSWUSTERHAUSEN.



A general view of the well-known German station, which, apart from ordinary broadcasting, works as a commercial station and also radiates telephony on short waves.

also a moot point whether the B.B.C. is right in spending what it does on the hiring of 5 S W.

Such a new short-wave station should undoubtedly be part of a Government scheme, and we understand that the matter will probably come up for consideration by the British Cabinet at an early date.

British "Indifferent."

One of our readers from Nairobi, in Kenya, criticising our article "Home Listeners First," suggests that our attitude is on a par with the indifference displayed by the British motor-car manufacturers in meeting the overseas requirements for British cars. He asks: "Why are 90 per cent of the cars in use in the British Colonies American?" And he supplies the answer: "Service, reliability and suitability for Colonial requirements."

Our correspondent also suggests that the policy we adopt in connection with short-wave Empire broadcasting adds to the

to contribute to Empire broadcasting, and he suggests that if they haven't, why not give them a chance.

For instance, in Nairobi, private individuals pay a receiving licence fee of more than £2 10s. per annum. Surely, points out our correspondent, a proportion of that sum could be paid annually to the B.B.C. for a really efficient short-wave service from England?

If it is a fact—and we have not checked this statement—that British listeners in the Colonies and Dominions have not been approached, as a body, to contribute in some way or other to an Empire broadcasting fund, then we suggest to all our newspaper contemporaries in the Dominions and Colonies that such a fund be started.

There is still so much to be done in improving British broadcasting at this end, that it is only natural that home British listeners should expect their contributions to the licence revenue to be devoted to home broadcasting.

The NEW "P.W." SAFE POWER UNITS



By G. P. KENDALL, B.Sc.

NOWHERE in the whole of our survey of mains units and their design have we found a greater need for drastic revision of common practice than in the associated questions of de-coupling and voltage adjusting methods.

Crude and inefficient devices used in the earliest days of mains working are still quite commonly seen, and are at the bottom of a very large proportion of the "motor-boating" troubles our readers report.

Such schemes are definitely not good enough under modern conditions, for every new improvement in valves, L.F. transformers, and so on, increases the tendency of our sets to motor-boat.

The Motor-boating Bogey.

Careful as the designer may be to make a set as "safe" as possible, with all due precautions to ensure stability, the unalterable fact remains that we are getting much higher magnification than we used to do, and so there is a greater danger of motor-boating and similar troubles if we use a badly designed mains unit. This we regard as one of the crying needs of the moment in radio.

Let us just see what is meant when "de-coupling" is mentioned. Well, what it really amounts to is this: the valves in your set are all draining their anode currents from the H.T. unit, and if you let those currents all pass through a common resistance or inductance a coupling effect is set up, and

Evidently, then, we must provide separate tappings for various valves, and we must see that those tappings are well and truly separated *electrically*.

What it amounts to is this: when a set is working the anode current contains what is called an "alternating component," and it is these little alternating currents (signal currents really) which cause all the trouble.

What we have to do is to see that these alternating currents are shunted away to the earthed side of the circuit (i.e., the negative) directly they arrive at the positive terminals of the H.T. unit. Further, we must see that they are definitely stopped

filter of the "cascaded" type, with two chokes and a 2- and a 4-microfarad condenser. So far so good, but what about "separation" of the output tappings?

You will see that there are two of these tappings, of which one is straight off the end of the smoothing filter, and is intended for the L.F. valve or valves. (It is usually safe to run two L.F. stages off one tapping.) The unit is intended only for comparatively simple sets, and so there is only one other tap, namely one giving a lower voltage for the detector.

This lower voltage is obtained by means of a "potential divider," marked P. This is simply a resistance of a suitable type connected right across from positive to negative of the circuit, and provided with tappings from which various lower voltages can be obtained as desired.

Easily Remedied.

This is all very well so far as the adjustment of the detector H.T. voltage is concerned, but what is there to prevent the alternating currents from the detector getting mixed up with those of the L.F. valve or valves, and so producing coupling effects? Nothing, except the by-passing effect of a 2-microfarad and a 4-microfarad condenser, and the part of the resistance of P above the detector tapping.

This is not nearly enough in many cases. Something more drastic and positive is

Mains units and sets are becoming more and more popular and their popularity will increase as the new electricity schemes are brought into operation. In view of this, the "P.W." Research Dept. has decided to carry out intensive investigations into the subject of radio mains devices with a view to the production of safe designs that will completely meet the requirements of modern times. Safety in installation and operation, and inexpensiveness in construction and low running costs are the main ideals at which we are aiming. Some indication of the measure of our success is given in the accompanying article, the fourth of a short introductory series.

4. DE-COUPLING AND VOLTAGE ADJUSTMENT.

from getting into other parts of the H.T. circuits where similar currents from the other valves may be flowing.

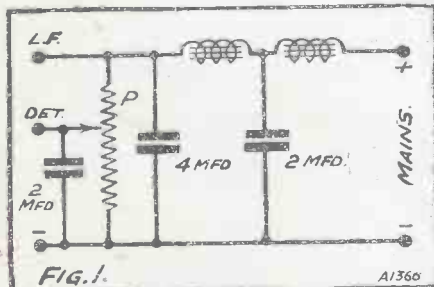
That is what is meant by "de-coupling" and "electrical separation." There is nothing very mysterious about it when we understand what it is that we have to do, and the arrangements required need not be at all complicated.

It is just a matter of using such components as are normally provided in an H.T. unit to full advantage, and not wasting many of them, as is so often done.

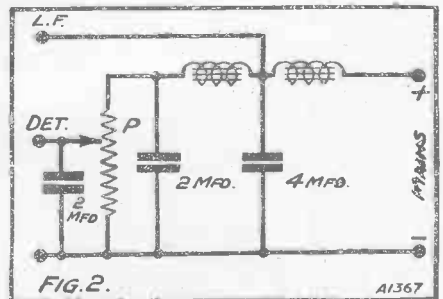
A Typical Example.

A concrete example of a circuit in which thoroughly unsatisfactory de-coupling is provided is given in Fig. 1. This is quite the type of circuit you will see in some home-construction designs, and likewise in some of the cheaper commercial units, and it is to be noted that its failings are entirely due to the unsatisfactory arrangement of the parts. We should not need anything extra to get quite a good circuit.

The circuit consists of a simple smoothing



Serious coupling effects can occur in a mains unit employing this arrangement, but



the set wouldn't howl if the circuit of the mains unit were re-arranged in this way.

L.F. howling or motor-boating is pretty sure to be the result.

If you want a demonstration, just try running all the valves in an average four-valver off the same positive tapping on a mains unit. You will probably make it a very brief test indeed!

called for if the set is a modern one giving high amplification. What is more, it can be got by making just one very simple little modification, and without using any extra parts whatever.

All that we have to do is to take the L.F.

(Continued on next page.)

THE NEW "P.W." SAFE POWER UNITS.

(Continued from previous page.)

tapping from a different point in the circuit. Look at Fig. 2 and you will see what is needed. Here you will observe that the L.F. tap is taken from an earlier point in the smoothing circuit, and no longer from its end.

We shall no longer be getting such thorough smoothing of the current supplied to the L.F. valve, but it is not needed here. We only require quite a moderate amount of smoothing at this point, because any ripple is not amplified up as it would be in the case of the supply to the detector valve.

It is really only the detector which requires such a perfectly "clean" supply, since naturally any hum here is always magnified by the L.F. valves along with the signals.

Better De-coupling.

Smoothing remains good, therefore, and we now get far better de-coupling. Between the detector and L.F. tappings we now have not merely a portion of the resistance, but also the choke L_1 , which presents a very effective barrier to alternating currents.

The signal currents are therefore rigidly separated, and are forced down to the negative side of the circuit through the various condensers and so become harmless.

There is much more to be said about smoothing and de-coupling in general, but this example should suffice to show that the arrangements in common use are open to considerable rearrangement and modification to secure much better effects.

We shall have to deal with these matters later, when we begin to give examples of

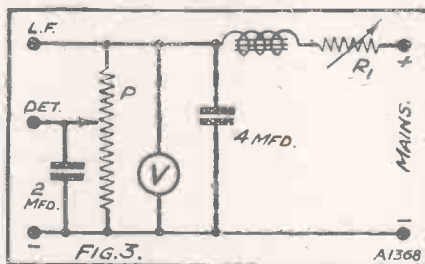
actual units on the new rationalised lines. Space will not permit us to go any further at present. We have said enough to indicate, we think, that our review of the position was much needed.

Now, what about methods of voltage adjustment? This we have found to be one of the chief stumbling blocks in the way of the man who wants to use the mains for his H.T. supply and cannot afford to buy expensive measuring instruments to tell him where he is.

Measuring the Voltage.

With many existing schemes there is an element of guesswork and groping in the dark about this business of voltage adjustment, which is very discouraging to the man who wants the best results and the longest life from his valves.

For example, in the Fig. 1 circuit the user has only a vague idea of the voltage actually reaching the detector valve, and only a rather expensive type of voltmeter is capable of measuring it at all accurately.



A very cheap voltmeter can be used for calculating the outputs if it is used like this.

This is not a very serious point in actual practice, however, because the voltage used will be fairly low, and so you can be sure that it will not injure the valve.

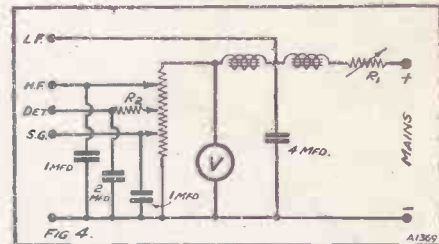
It will normally be adjusted experimentally, of course, to such a figure as is found to give smooth reaction, and this will almost always be quite a low voltage.

Evidently, the only objection here is a feeling of uncertainty, for most of us like to

know what voltage is actually in use. When we come to the L.F. valve tapping things are rather different.

Here we are obviously getting quite a high voltage, and few users know how to find out what it is.

It is possible to estimate it, and as a general rule you can reckon that in a circuit



Applying the scheme to a more ambitious circuit.

like this, using fairly good chokes, it will be somewhere about 20 volts below the voltage of the mains, even on quite heavy loads.

Suppose, then, that your mains are of 220 volts, the last valve will be getting at least 200 volts, which is decidedly too much for very many of the types in common use.

This is a common defect in mains units of the simpler types, and it is evident that some scheme must be provided for voltage adjustment here, and then you get up against the real difficulty of finding out where you are.

In this case there is no indication in the behaviour of the set to tell you that the voltage is right, and so you come up against the guesswork difficulty again.

We have spent quite a lot of time on this particular problem, and have now got a solution which we believe represents a thoroughly satisfactory solution. It only calls for the fitting of quite a cheap type of voltmeter, which can actually be built into the unit.

Permanent Reading.

This instrument then gives you a permanent and quite closely accurate reading of the voltage on the L.F. valve or valves. Knowing this, you can estimate quite easily the voltage on the detector, provided that you employ a suitable type of potential divider, a point we shall explain in greater detail in our practical articles.

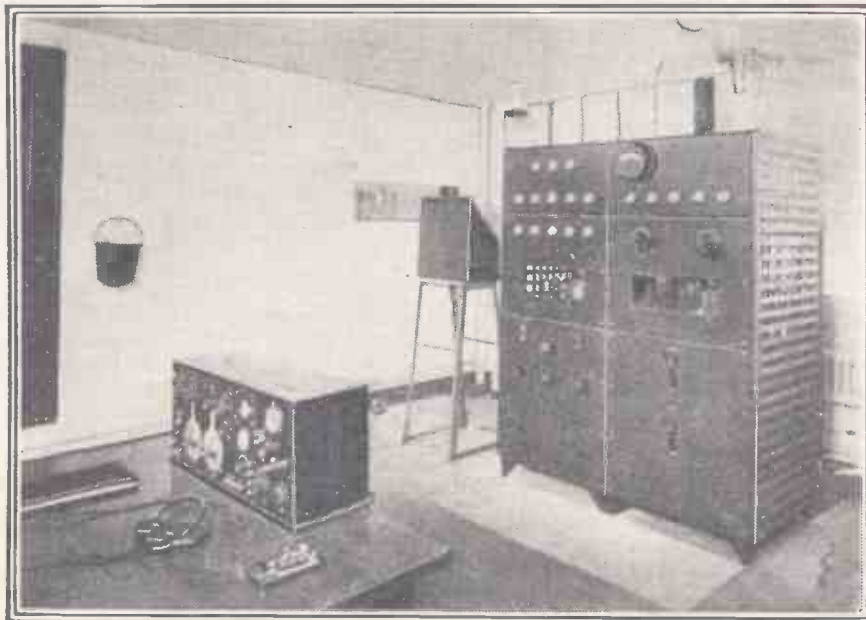
The scheme is shown in one of its simpler forms in Fig. 3. The voltage across the whole H.T. circuit is controlled by means of the master resistance R_1 , and the idea is to adjust this until the voltmeter, V, shows a suitable figure for the L.F. valves. You then know definitely that all is well here, and can further estimate the voltage on the detector in the manner to which we have already referred briefly.

We cannot go into these points in full detail yet, but you will no doubt be able to grasp the gist of the scheme from this condensed explanation. An example of a larger and more elaborate H.T. unit for multi-valve sets is given in Fig 4, and this will help you to see how the scheme can be applied to various types of units.

These, of course, are matters we shall have to elaborate later when we come to our practical designs, together with special points arising in A.C. units, which we have not treated in these preliminary articles.

The whole question of safety precautions is likewise being reserved for the future.

NEATLY ARRANGED U.S. STATION.



The controlling apparatus and one of the main panels at the New Jersey station, 2 X C R. Note the Morse key in the foreground. This is used to pass on, telegraphically, any police or maritime S.O.S. calls that may be received.



WHEN CURRENTS SPILL OVER

You switch on the set, and zip!—the valves burn out! Short circuits aren't necessary for such expensive demonstrations as this, as the following article shows.

By CARDEN SHEILS.

WHEN any direct-current circuit containing inductance is rapidly broken, the spreading field of magnetic force located around the inductance coils collapses suddenly, so that energy previously stored up in the ether is suddenly transferred into the circuit, making itself felt as a surge of current.

In other words, the collapse of the lines of force around the inductance induces a back EMF proportional to the rate of change of the flux. The larger the inductance and the greater the current originally flowing, the more violent will be the "kick" when the circuit is broken.

Effect of the Switch.

It will, therefore, be seen that the opening or closing of a switch is capable of doing serious damage. A transformer may be burnt out, or a condenser broken down, and in certain cases the valves of a set may be burnt out.

At first sight the danger may not seem so apparent when a switch is closed as when it is opened, since in the former case the

risk is certainly greater on "break" than "make," since in the former case the "freak" voltage on the condenser C_1 may amount to three or even four times the normal voltage of the mains.

So far the filter has been considered as an open circuit. If a resistance R is connected across the points $A B$, to represent the load or current consumption of the receiving set, conditions will be considerably improved, and by suitably proportioning the ratio of

of using thermionic rectifiers—particularly those with indirectly-heated or heavy-consumption cathodes—is that, in effect, they introduce a "lag" during switching, owing to the heat inertia of the cathode.

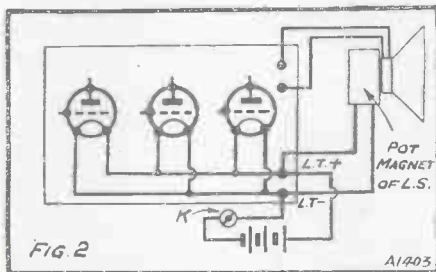
The pot magnet of a moving coil is another possible source of damage under certain conditions. For instance, suppose a speaker with a 6-volt winding is connected directly to the filament terminals of a receiving set, as shown in Fig. 2, the filament supply being controlled by the switch K .

A Safety Resistance.

It will be seen that the inductance of the pot magnet of the speaker is shunted directly across the valve filaments. Here, the first time the receiver is switched off may very likely be the last, for that particular lot of valves, because the back kick from the inductance of the speaker windings may be sufficiently vigorous to burn out every valve in circuit.

In some cases it is the practice to insert a panel lamp across a filament accumulator feeding a moving-coil speaker in parallel. Here, again, the lamp is very likely to be "blown" every time the filament circuit is broken—even if the valves escape.

The remedy is, of course, to insert a control-resistance R , as shown in Fig. 2 A. It is advisable to use a 30-ohms rheostat



The valves in this arrangement may easily burn out.

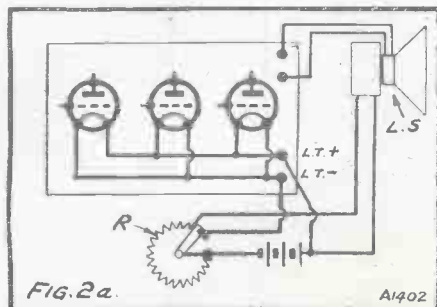
capacity to inductance it is possible to ensure that no damage is done. With a load, i.e. the receiver, in circuit, the load current continues to flow through the choke L , even after the condenser C_2 is fully charged, so that the "kick back" is minimised.

Unfortunately, the conditions that minimise current growth at "make" tend to increase the danger at "break." "Make" conditions are best with a heavy choke L , and a large "load" current. On the other hand, a large current and heavy choke produce a strong surge at "break." Hence, a compromise is necessary.

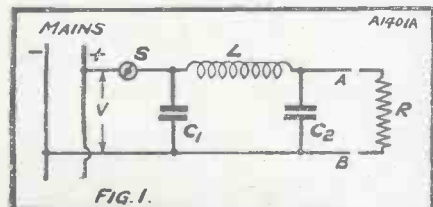
The Mains-Driven Set.

Keeping the LC product at the value necessary to ensure efficient smoothing, small output currents may be smoothed by a filter comprising smaller condensers than when larger loads are to be handled. This minimises the risk of breakdown when switching on or off.

When operating a mains-driven set, the high-tension source should be switched on after the filament circuit has been made, and switched off before the filament supply is broken. In this connection one advantage



Here is the Fig. 2 arrangement, with a safety control-resistance added.



Condensers C_1 and C_2 may get charged up to a higher voltage than that of the mains themselves.

inductance in the circuit merely acts to retard the rising current. If, however, we examine a simple filter circuit, such as shown in Fig. 1, it will be seen that when the switch S is closed, the first condenser C_1 is charged instantaneously from the mains.

The current then rises gradually in the choke or inductance L and slowly charges the condenser C_2 . When C_2 reaches the voltage V of the mains the charging current ceases. As it stops the field around the inductance L collapses and so induces a back EMF, which overcharges the condenser C_2 to an extent which may be considerably in excess of the voltage of the mains.

with a few of the end turns removed and a strip of copper added for the valve filaments. The battery is connected to the moving arm and energises the field magnet gradually. The valves are lit last, the final position of the moving arm making contact both with the strip and the end of the resistance wire.

With a set operated from batteries, instead of from the mains, the dangers of switching are lessened, since both the voltage and current consumption are reduced.

LATEST BROADCASTING NEWS.

Mrs. SNOWDEN WINS

G. B. S. AGAIN—GRAND NATIONAL ARRANGEMENTS—PROGRAMMES PROMISED—“LOOKING BACKWARDS”—“I REMEMBER.”

THE reappointment of Mr. Howard Marshall to the staff of the B.B.C. on his own terms is undoubtedly an event of special significance. The vicissitudes of the strange case of Mr. Marshall have been followed in these columns, but they deserve recapitulation. Mr. Marshall was taken on by the B.B.C. early last summer as a probationary announcer.

His success was immediate, listeners all over the country testifying to his supreme qualities at the microphone. But when it came to consider whether Mr. Marshall was to be confirmed in the appointment, he declined to accept the pittance which was then dignified with the name of starting salary for announcers.

And as the B.B.C. would not budge, the conversations lapsed, and the microphone lost perhaps its supreme master for a matter of about £100 a year. Then it so happened that there was a temporary job going in the news section. This was offered to Mr. Marshall, who again displayed conspicuous ability.

But by December the temporary job finished, and Mr. Marshall was duly informed that the B.B.C. did not want him any more. Meanwhile, other influences were at work. It is believed that Mrs. Snowden, in particular, having heard of the outstanding ability of Mr. Marshall, took up the cudgels to retain him.

What actually happened then is shrouded in mysterious silence. But the thing that matters is that Mr. Marshall is now reinstated at Savoy Hill as deputy to Miss Matheson, the Director of Talks. Moreover, Mr. Marshall has every reason to be satisfied with the emoluments and conditions of his new appointment. The staff at Savoy Hill regard this incident as definitely “one-up” for Mrs. Philip Snowden.

G. B. S. Again.

Thousands of listeners will look forward to hearing a speech by Mr. George Bernard Shaw at a public meeting in the Kingsway Hall, London, which is to be broadcast from 5 G B on Friday, January 31st.

The meeting has been convened by the British Drama League in support of the National Theatre, and Mr. Shaw's pronouncement is certain to be awaited with the keenest interest. Two days previous, on Wednesday, January 29th, Mr. Walter Graham, M.P., President of the Board of Trade, will speak in the London Studio on “Our Export Trade.”

Grand National Arrangements.

Hitherto a running commentary on the Grand National has been one of the most difficult outside broadcasts undertaken by the B.B.C., mainly because of the com-

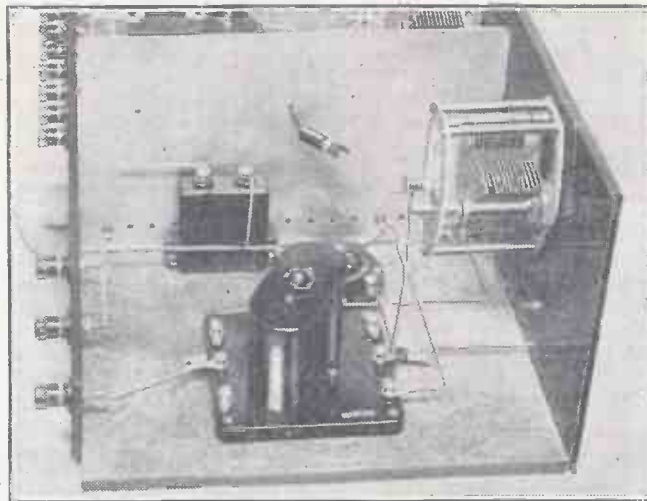
mentators inability to identify the horses over the whole course from a position in the Grand Stand. An attempt will be made to remedy this unsatisfactory state of affairs when this year's National is run on Friday, March 28th, by having two commentators, one in the Grand Stand and the other at Canal Turn.

It is not intended, however, to broadcast two accounts of the race, but to dovetail the descriptions of each narrator into a continuous story, so that a more accurate and comprehensive survey of the most strenuous horse race in the world can be transmitted to listeners.

Programmes Promised.

Here are a few brief items taken from forthcoming programme items:—

Monday, January 27th (5 G B) and Wednesday, January 29th (2 L O, 5 X X and other stations): “La Bohème,” by Puccini, relayed from the Parlophone Studio.

THE TWIN-WAVE THREE.

This photograph shows the “aerial end” of the splendid set described in “P.W.” a fortnight ago.

FOR THE LISTENER.

A Specially Contributed Criticism of Current Broadcasting Events.

By PHILEMON.

(Who is deputising for Mr. Cecil Lewis while the latter is in America.)

IF you are interested in religion at all, you ought not to miss Dr. Waterhouse on Sunday afternoons. His manner is a little bit against him, and you are not likely to agree with all he may say, but there is no doubt about his scholarship or his sincerity. He is a professor; but professors are often much broader-minded than laymen nowadays. He avoids jargon, and that's a mercy!

Eaten By Bela Bartok!

Bela Bartok, the Hungarian composer, beats me. I cannot make head or tail of his bigger music. There were moments during his performance when I imagined that by some hideous mistake the “noises-off” studio had invaded the programme.

I mind, however, that something of this kind used to be said of Wagner and Strauss.

Tuesday, January 28th: “Tommy's Little Day,” by Percy Merriman, or “An Episode of Life in the Army,” as portrayed by the Roosters' Concert Party (2 L O, 5 X X and other stations).

Tuesday, January 28th: “What's Right with Scotland,” the first home-made Scottish radio revue (all Scottish stations).

Monday, February 3rd: Special programme conducted by Weingartner, the distinguished German conductor, relayed from the Continent (2 L O and other stations).

“Looking Backwards.”

Another important forthcoming talk is that on Tuesday, January 28th, the third in the series entitled “Looking Backwards.” This talk, which is to be given by Mr. H. W. Nevinson, will describe his experiences as War Correspondent, and should be very entertaining.

Mr. Nevinson was correspondent in the Greek and Turkish War of 1897; the Boer War; the Street Fighting in Moscow of 1905 to 1906; and, before the outbreak of the Great War, had also been present at the Spanish Campaign in Morocco in 1909, and was with the Bulgarian Army in 1912-13.

“I Remember.”

The Rt. Rev. Sir David Hunter-Blair, fifth baronet of Blairquhan in Ayrshire and Titular Abbot of Dunfermline, is to give the next talk in the “I Remember” series for listeners to Scottish Stations on Tuesday, February 4th.

As a song-writer, Bartok is superb. Some of his Hungarian folk-songs, sung gorgeously by Maria Basilides, were pure music and pure joy. So I shall not give him up.

Those Debates.

It is a question with me whether broadcast debates are better when the opponents are evenly matched or when one plays the sparring partner to the bigger man. What do you think? Of course, Mr. Leon M. Lion was no match for Mr. Agate the other night. He seemed to offer himself as a lamb for the slaughter. And Mr. Agate made mincemeat of him.

By the way, it seems to me a pity that two such promising fellows as A. P. Herbert and Gerald Barry should be put on to so well-gnawed a bone as the “Speed Limit.”

(Continued on page 1061.)

A RAPID GUIDE TO RADIO

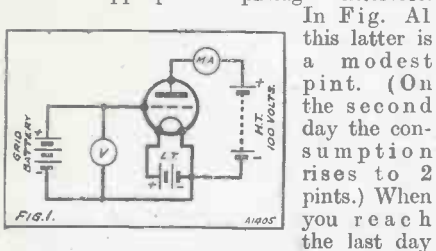
A JUMPING-OFF SERIES FOR THE NEWAMATEUR

By "Pentode"



CURVES can be prepared for almost anything. You can plot a curve for your household's consumption of milk. (This will serve as well as anything else as an example!) Taking a piece of squared paper you mark figures in up the side to represent pints and along the bottom for the days of the week and of the month (Fig. 1A).

On the first day you carefully note the family's absorption of milk and put a dot on the paper where the vertical line given to the day and the horizontal line marked with the appropriate "pintage" intersect.



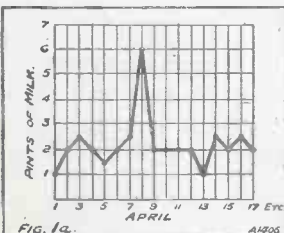
In Fig. 1A this latter is a modest pint. (On the second day the consumption rises to 2 pints.) When you reach the last day arranged for (April 17th on the Fig. 1A chart) you put in the dot and then join this to all the other dots with a line. You now have your complete milk curve.

Nasty Variations!

You can see at a glance if your milk consumption is steady or whether it fluctuates a lot. In our example there is a nasty peak. You want to know why this should be there; referring to the "curve" you see that on the eighth of April they swallowed up 6 pints. You advise them to endeavour to avoid such nasty variations from the steady line of even milk consumption!

There are several kinds of curves that can be drawn for a valve, but the most useful is the curve, the curve that is plotted with anode current and grid voltage.

The anode current is measured with a milliammeter ("MA" in Fig. 1) and the grid voltage with a voltmeter ("V" in Fig. 1).



All we do is to plot the various anode currents against the voltages across the grid and filament.

You can make the grid either negative or positive in relation to the filament with a battery joined up as shown in Fig. 1. Obviously in this particular case the grid is positive.

When the grid is neutral, i.e. when there is no potential difference between it and the filament we get the condition known

as "zero grid volts."

According to our Fig. 2 curve 4 milliamperes of anode current flow in these circumstances. If you follow the thick vertical line up from the "0" grid volts, you will see that the "curve" cuts through this line at 4 milliamperes. When there is a voltage difference between the grid and filament of 1 volt negative there is 3 m/a. of anode current.

You will know that this is just as it should be because the more negative the grid is the less the electrons that can get through to the plate. And the smaller the electron stream between the filament and plate the smaller the anode current.

When the grid is definitely positive in relation to the filament, it begins to assist the electron flow, and thus increases the anode current. But you cannot go on increasing the anode current by making the grid more and more deficient in electrons (more positive).

There is no reason why new readers should not read these interesting and instructive articles. Of course, they will have missed a great deal of helpful information, but the articles have been prepared so that they fall into self-contained groups. For instance, this week the subject of valve curves is dealt with in such a way that readers who missed the foregoing articles should still be able to gain a fairly clear insight into the operation of the valve.

16. HOW TO READ VALVE CURVES.

There comes a point where the grid begins to attract the electrons to itself, and current flows round the grid circuit. If you increased the potential difference between the grid and filament greatly, it would rival the plate as a collector of the electrons from the filament. Finally, the anode current would drop to zero, no electrons at all getting past the greedy grid.

This is a condition that is not wanted in wireless; the function of the grid is to control the filament-plate electron stream, not divert it entirely.

The Negative Side.

Actually, we seldom work with the grid of the valve more than slightly positive; generally we confine its activities to the negative side of that zero line in Fig. 2. In L.F. amplification a positive grid is a tragedy of the most terrific kind!

You will see in Fig. 2 that the suppositious valve we are dealing with has a maximum anode current of a little above 4 milliamperes when 100 volts H.T. are used. This anode current drops to zero when the grid is about 5 volts negative.

A portion of the "curve" is straight, and it is vital that you should realise the importance of this. It is straight between 1/2 and 3 negative grid volts. Any grid

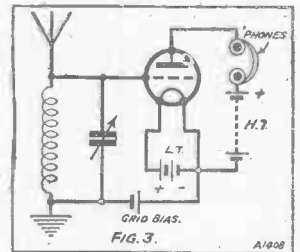
voltage variations between these result in equal anode voltage variations.

If you increase the negative grid voltage from 2 to 3 you drop the anode current from 2 m/a. to 1 m/a. Likewise a decrease of grid voltage of the same order, i.e. 1 volt (from 2 to 1) results in a rise of anode current from 2 m/a. to 3 m/a.

An equal variation in grid volts from 3 volts negative results in an unequal anode current variation.

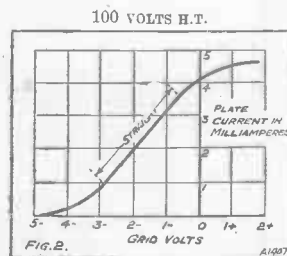
An increase from 3 to 4 is not followed by the same variation as a decrease from 3 to 2. You are off the straight part of the curve and are, indeed, sliding about in the "bottom bend." And this is how you can make the valve rectify without using a grid leak and condenser.

Supposing we made the grid of this valve 3 volts negative with a battery connected up as shown in Fig. 3. We have now "biased" the grid so that there is 1 milliampere of anode current flowing.



Anode Bend Rectification.

The grid is going to be made alternately less than 3 volts negative and more than 3 volts negative with the variations imposed on it by the energy flowing in the aerial circuit. But the anode current will not rise and fall evenly. It will rise to a greater degree



with the less negative condition than it will fall with the more negative condition. In short, the electron shortages have more effect than the electron additions due to the aerial oscillating energy. The positive half gets away with it while the negative is severely cramped by finding itself well in that "bottom bend." And thus, anode bend rectification! We bias the grid so that unequal treatment is given to the positive and negative differences of potential occurring across the aerial coil at H.F.

Think in electrons and you can read every riddle in radio.

"A MAGNIFICENT CIRCUIT"

The Editor, POPULAR WIRELESS.

Dear Sir,—May I take this opportunity, although rather late, of congratulating you upon the performance of the "Magic" Three. I was not a regular reader of "P.W." prior to the appearance of this circuit, however, my wireless enthusiasm has been rekindled and I have consequently placed an order with my newsagent. When building the receiver I adhered strictly to your specification and only used components manufactured by reputable firms. I have taken your advice and placed a 1/2-meg. grid leak across the secondary of the second transformer as same improves the tone.

May I say that the purity is indeed superlative and you cannot help bringing in foreigners. In fact, Toulouse is received, at times, quite as loud as London, which necessitates the use of the volume control. One of my friends, an electrician, said it was the first time he had heard of a three-valve requiring a volume control on foreigners. I have been fortunate to identify the following stations:

Cork (Ireland, only received once), Cologne, Barcelona (Cataluna), Nurnberg, Konigsberg, Toulouse, Bratislava, Hërby (Sweden), Turin, Moravska-Ostrava, Göteborg (Sweden), Langenberg, Breslau, Milan, Paris (Petit-Parisien), Madrid, Radio Barcelona (very weak), Vienna, Bucarest, Budapest, Katowice, Rome, Lyon? (France).

May I say that the above were received on the loud speaker and not on 'phones.

I have not experimented to any extent on the long waves, however. Radio-Paris comes in as well as Daventry (5 G B), and their Sunday concerts are very much enjoyed. I feel I could write pages in appreciation of the "Magic" Three, however, I must close by wishing you every success, and thanking you for such a magnificent circuit.

Believe me, sir,

Yours faithfully,

L. H. KING.

Battersea, S.W.11.

"EXCEEDS MY EXPECTATIONS"

The Editor, POPULAR WIRELESS.

Dear Sir,—I have built the "Magic" Three, and now am more than satisfied. I really have not yet bothered to count up all the stations I can get on the speaker—at least twenty medium-wave after dark. At the moment Rome is simply roaring in.

At first I had great trouble with the set. When I first switched on there was nothing but a terrible squeal. I substituted a 1/2 meg. grid leak for the 2 meg. as specified, and found things a bit better; it only squealed when I put my hand near the detector valve or potentiometer.

It brought in Brookmans Park at quite good strength all over the dial, and 5 G B and one or two foreigners.

Of course, I fiddled about a good bit, but it was not much good.

Then I built the "Magic" Two for a friend, and found it perfectly stable.

I used a Triotron H.D.2 with 40 volts on the anode as detector, and a Triotron S.D.2 with 100 volts on

THERE appears to be absolutely no end to the list of "certain cures" for threshold howl. The latest that I have heard of consists of wiring up the receiver with thinner wire than usual!

An acquaintance made up his receiver in new form, taking extreme care over the wiring, which he carried out with No. 14 tinned copper, and found that he could not do a thing owing to a fierce threshold howl!

After trying all known cures and finding that not one of them was efficacious, he re-wired the whole thing with the No. 18 wire that he had always used formerly, and all was well! Has anyone else any confirmation of this to offer before I enter it in the immortal records?

Minimising Hand-Capacity.

I discovered this week-end a fact that will probably be very useful to those readers who find it difficult to escape "hand-capacity effects" on their receivers.

I do not refer to those who wire the reaction condenser at the "live" end of the reaction coil and then have trouble with that, but to those who have all the sets of moving plates at earth potential and still cannot get rid of the trouble; in those cases touching the L.T. or even the earth lead itself will generally alter the tuning.

In such cases as these the trouble is nearly always due to a long earth lead or to a bad

CORRESPONDENCE.

The "MAGIC" THREE.

A FURTHER SELECTION OF LETTERS FROM READERS WHO HAVE BUILT THIS IMMENSELY POPULAR RECEIVER.

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

the anode, and 3 volts negative grid bias for the L.F. So I am only taking 3 milliamperes from the H.T.B. and get the two Brookmans, 5 G B, and five or six foreigners on the speaker, and many more on the 'phones.

It is very selective, so naturally it set me wondering as to what was wrong with my "Three."

I substituted for the coil holders in my "Magic" Three the coil holders from the "Magic" Two (Lissen), replaced the 2-meg. grid leak, and switched on.

The set was perfectly stable at once, with knife-edge selectivity and wonderful volume on the foreign

NEXT WEEK.

Full details will be given in P.W.

of

The "MAGIC" RADIOGRAM SET

Order your copy now.

stations, though my aerial is six years old and rather large. It is of Electron wire.

I enclose the original coil holders which caused all the trouble, as they may be of interest to you. Their losses must be terrific. Please don't bother to return them. I never want to set eyes on the beastly things again.

I only bought them because I was in a hurry to catch a train, and took the first things they gave me. I must be more careful over my purchases in future!

I have incorporated an output filter, as there are

SHORT-WAVE NOTES.

By W. L. S.

earth, and in two cases that have arisen recently I have succeeded in curing the trouble by tuning the earth lead with a series condenser.

With a .0005 variable condenser in series with the earth lead some spot on the dial is almost always found at which the receiver is completely free from hand-capacity, and there is no loss of signal-strength whatever.

Strange to relate, hand-capacity troubles can sometimes be due to the length of the aerial. I, myself, have a receiver in use now that is very nice and well-behaved on the outside aerial, but which produces quite a perceptible change of tuning when I handle the dials if I use it on an indoor aerial that I have erected in the loft.

Even in this case, though, a series condenser in the earth lead puts matters right, while a series condenser in the aerial has no effect whatever.

The night before writing this the transatlantic signals were coming over at 11 p.m. on 20 metres as I have not heard them for a

long leads to other rooms, and the whole thing really exceeds my expectations.

Thanking you and the "P.W." technical staff for a really excellent design, and wishing you all the compliments of the season.

I remain,

Yours faithfully,
CHARLES H. ARNOLD.

Sussex.

[The coil holders are of French manufacture and are of exceptionally poor quality. Our correspondent's experiences clearly prove the advisability of keeping to good, branded components.—TECHNICAL EDITOR.]

"AN EXTRA GOOD SET"

The Editor, POPULAR WIRELESS.

Dear Sir,—I have recently constructed the "Magic" Three for a friend, and I found it much too loud on an outdoor aerial; so I tried about 25 ft. of twin flex put up roughly round the room, and the results were splendid. Without using any reaction I could easily separate the twin transmissions from Brookmans Park, and by using a little reaction I could also receive 5 G B at good strength, also some foreign stations. My friend is using an indoor aerial and is getting good results, and is naturally delighted with the set. I think that one of its great points is the simplicity of operation. Thanking you for publishing an extra good set, and also for the useful information published each week in "P.W."

I remain,

Yours faithfully,
F. LEDGER.

Sittingbourne, Kent.

"TRULY AMAZING"

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel I must let you know of the unexpected results obtained from the "Magic" Three circuit.

The purity of tone is truly amazing. It is surprising how simple the circuit is to control, after very little practice.

I have obtained perfect loud-speaker volume from at least thirty different stations, a thing I have never achieved before.

Wishing you every success,

Yours faithfully,

W. H. W.

P.S.—Have received orders to make three sets from friends, after having heard mine. Billericay.

"CONGRATULATIONS!"

The Editor, POPULAR WIRELESS.

Dear Sir,—I have recently built your "Magic" Three. Congratulations! A splendid set in every way. Beyond my greatest expectations.

C. BECKITT.

Buxton, Derbyshire.

long time. It looks as if a complete change in conditions is due, as the rule for over a month on this wave-length has been complete silence, even on the part of the high-power commercials, after 8 or 9 p.m.

On the 40-metre band, also, conditions are better, long-distance signals coming through quite well during the late afternoon and early evening. The Philippine Islands and India have been heard "side by side," so to speak, at 4.30 p.m. both coming over at enormous strength considering the low powers used by the stations at the other end.

Popularity of Det.-L.F.'s.

I have received a card from New Zealand, for the Dorchester station that I mentioned in these notes a few weeks ago as working with the "Elettra." Apparently Dorchester's telephony goes out well, as he is reported R 6 in the Antipodes, with perfect modulation, and every word and note audible.

I have been asked for the result of my ballot on the different types of receivers. I had intended to keep it for another week, but as no more seem to be coming in, I publish it now:

	Per Cent
1st. Detector and L.F.	65
2nd. S.G., detector and L.F.	29
3rd. Superhet	4
All other types	2

That looks fairly conclusive!

PEOPLE WHO WANT PURE POWER TURN TO THE

LISSEN

NEW PROCESS

H.T. BATTERY

LISSEN

H.T. BATTERY
NEW PROCESS

Notice * ably improves loud speaker * tone

60
VOLT

SECRET
PROCESS

BIG
CELLS

SILENT
POWER

There is long life in the big cells of the Lissen Battery—there is pure current and power perfectly preserved. Crisp speech, clear song and music sharply defined is inevitably your reward when you put the Lissen Battery into your set. Steadily, silently, sustainedly the pure D.C. Current of this battery flows. There is never a sign of ripple in it, never a trace of hum.

Right through the longest programme—through month after month of use the fine quality and abundant power of this current is maintained. It is economical current and safe current—safe for the children and all at home.

You need pure power for pure reproduction—the secret process of the Lissen Battery gives it to you and in no other battery do you get it.

DIRECT FROM FACTORY TO DEALERS' SHOPS

EVERY LISSEN BATTERY IS FRESH WHEN YOU GET IT!

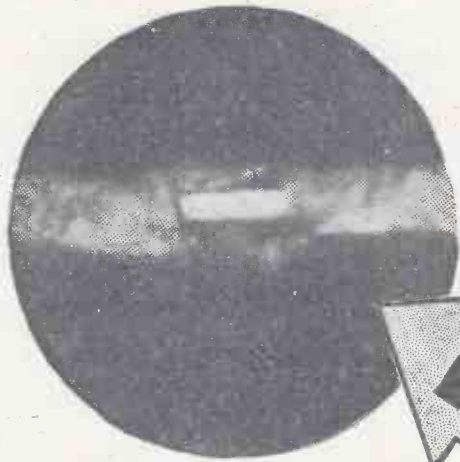
Next time ask firmly for a Lissen New Process Battery and take no other. It is obtainable in all popular sizes at 10,000 radio dealers.

PRICES :

60 volt (reads 66) ..	7/11
100 volt (reads 108) ..	12/11
120 volt	15/10
36 volt	4/6
60 volt (Super power) ..	13/6
100 volt (Super power) ..	22/-
9 volt Grid Bias	1/6
4 volt Pocket Battery ..	
(5d. each, 4/6 a doz.)	
Single Cell Torch Battery	4d.

LISSEN LTD.

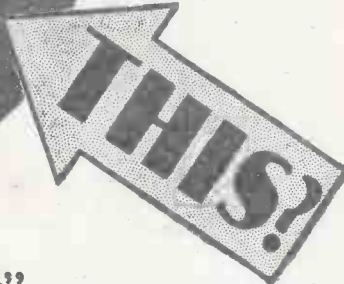
Worp̄le Road, Isleworth, Middlesex. Factories also at Richmond (Surrey) and Edmonton.
(Managing Director: T. N. Cole.)



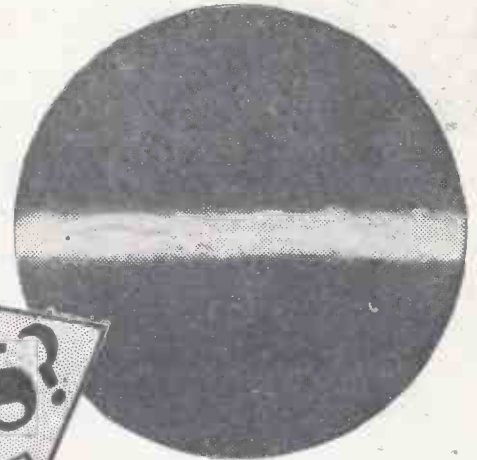
**A BAD Filament
WITHOUT
"TENACIOUS COATING"**

Reproduction from an untouched microphotograph showing part of the filament of a badly coated valve before use, showing a serious gap in the coating. A gap such as this starts the valve off in its life with a poor performance. The valve then prematurely fails.

**Which would
you choose-**



or



**A GOOD Filament
WITH
"TENACIOUS COATING"**

This reproduction shows the coating typical of all OSRAM VALVES. Notice the absolute evenness of the coating. There are no gaps, the coating clings, so that the full benefit of the coating is maintained. The secret is the startling discovery of the scientific process of "TENACIOUS COATING."

SOLD BY ALL WIRELESS DEALERS

WRITE for booklet "OSRAM WIRELESS GUIDE" giving full particulars of the full range of OSRAM VALVES with the "TENACIOUS COATING." Also helpful wireless information of importance to every listener. Sent post free.

**Osram
Valves**
with the
"TENACIOUS COATING"

MADE IN ENGLAND



THE SECRET of the INSULATOR

Why does an insulator insulate? This was a question that for many years worried early searchers after electrical truth. Now, however, we have probed into the secret of the electron barrier and wrested the facts from the very heart of the non-conductor. This secret is divulged for readers of "Popular Wireless" in this fascinating article.

By J. F. CORRIGAN, M.Sc., A.I.C.

known to consist of a central group or cluster of positively-charged particles (termed the "nucleus" of the atom), around which revolve at relatively great distances a number of still smaller particles, negatively charged, which are known as "electrons."

Now the positive charge of the nucleus of an atom is exactly counterbalanced by the sum of the negative charges on the electrons. Therefore, an atom is a perfectly neutral body, and so ordinary material things, being comprised of vast numbers of atoms, are usually electrically neutral.

However, if, by any means, one or more electrons are detached from the atom, the latter becomes electrically positive. In such a state, the atom is said to be "ionised," and it will act as an electrical conductor.

Current Flow in Conductor.

These facts are very important ones, and they should be grasped clearly by anyone who wishes to understand the mechanism underlying the nature of insulation.

Consider now the state of affairs prevailing when an electric current "flows" through a wire.

The wire is made up of an almost infinite number of atoms all packed closely together.

On applying a difference of electrical potential to the ends of the wire, one or more of the electrons belonging to the atoms at the end of the wire will be torn away. The atoms become ionised.

Therefore, they are electrically positive. As such, they take to themselves electrons from the adjacent group of atoms. These, in turn, become ionised, and these also abstract electrons from the next group of atoms. It is, therefore, this continual interchange of atoms which constitutes the "flow" of an electric current.

If a material is made up of atoms which do not readily undergo this exchange of electrons the electric flow is weakened, and the material is known as a "resistance medium."

It is obvious that in insulating materials the electrons must be held by exceedingly powerful forces to the central nuclei of the atoms, or else that the atoms themselves are held together as molecules in strong and complex combinations which are in some way able to prevent the electric potential from detaching electrons from the individual atoms to any appreciable extent.

Colloids for Insulators.

In view of the latter suggestion it is interesting to note that attention has only recently been called to the fact that many insulators are colloidal in nature. Now many substances exist in what is termed a "colloidal" condition. A colloid, in the modern chemical meaning, may be taken to denote practically any solid which is not definitely crystalline. Thus, jellies, starches, glues, resins, albumen, etc., are all colloidal in nature.

The component molecules of colloidal substances are made up of very complicated arrangements of atoms. Hence it is that only the very simplest of colloids are ionisable. The more complex colloids, such as waxes, rubber, ebonite, paper, cotton, silk, gelatine, etc., are not ionisable at all, and thus in the pure state the electrons of

THE early pioneers of electrical science classified material things into two groups, viz.: those which would allow the passage of an electric current, and those which would not permit any appreciable amount of current to traverse them.

It was thus to this latter group of things that they applied the term "insulators," this word being derived from the Latin *insula*, "an island," and signifying in the minds of these early electrical pioneers bodies which when placed in a stream of "electric flux" would not allow the latter to flow through them.

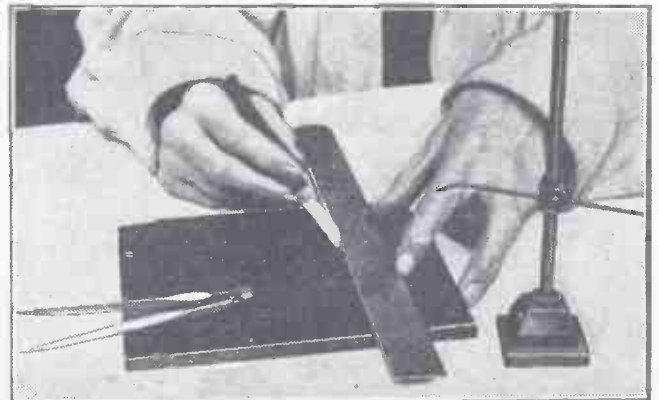
So much for the beginnings of our knowledge of insulators. Modern radio practice, together with the constantly increasing voltages which are being brought into use for one purpose or another, tend to make higher standards of insulation vitally necessary, and these facts have caused scientists to look into the whole subject of insulation afresh.

Atoms Are Not Solid.

Now, in order to improve the present-day standard of insulators it is obviously of the greatest importance for us to know just how and why insulating materials carry out their function of stopping the passage of an electric current. The possession of this knowledge on the part of our scientists would then enable them more readily to create new materials whose properties would approximate more closely to those of an ideally perfect insulator.

Strange to say, the real mechanism of insulation was hardly understood at all before the present age. Recent views on the constitution of matter, however, have been the means of placing the theory of insulators upon a new basis.

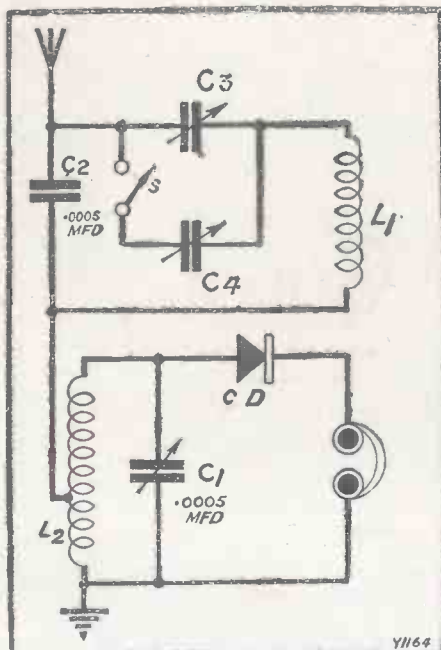
We know now, for instance, that the atoms of matter are not the solid, hard, impenetrable particles which they were formerly supposed to be. An atom nowadays is



For radio receivers the most popular insulator is ebonite or some very similar substance, of which rubber and sulphur are the main constituents.

their atoms are hardly detachable by even the highest of electric potentials.

Here, therefore, we have the secret of the insulator, and with it the hope of being able to produce new and improved insulating materials.

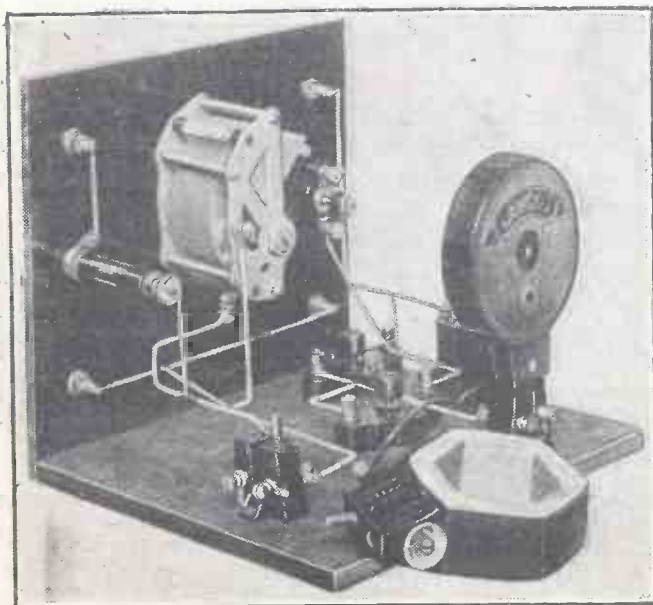


"The circuit looks wonderfully simple," you say? It IS simple. But when you hear the results you'll say "simply wonderful!"

THE selectivity problem raised by the arrival of the second Brookmans Park transmission is certainly a pretty difficult one, and it is bad enough in all conscience where valve sets are concerned. Many users of only moderately selective valve receivers seem to consider themselves rather hard done by now that we are getting a taste of the twin-wave transmissions, but what about the unlucky people who depend upon a crystal set for their programmes?

Strength and Selectivity.

So long as it was only a question of the single-wave transmission from Brookmans Park most crystal users just rejoiced in the fat and juicy signal they were getting, but now that the second station is taking the air things begin to look very different.



Anyone can build it—but no one can beat it!

Where valve circuits are concerned, of course, it is by no means a very difficult matter to get the extra selectivity we need by adding special schemes of extra tuned circuits with suitable coupling between them, and so on, but the crystal set is quite another matter.

You see, there is little strength to play with in a crystal receiver, and if we sacrifice even a little of it in some scheme of loose-coupled tuned circuits the set ceases to be a practical proposition, remembering that you have no reaction with which to boost up your signals again. The fact is that the majority of schemes for getting greater selectivity by means of loose-coupled circuits, and so on, involve a sacrifice of strength which has to be made up in some way which is not open to us in the case of a crystal set.

A Puzzle for "P.W."

As soon as the dual transmission started we set to work on this problem in the "P.W." Research Department, and for many days a number of normally cheerful experimenters went about with a strained and worried expression as the natural outcome of trying to hear the feeble whisper to which most of the super-selective circuits reduced the normally robust voice of Brookmans Park.

While these experiments were going on we all got into the habit of talking in whispers lest some worried individual with the 'phones on his head should turn round and utter horrid threats, and one member of the staff whose voice normally suggests three L.F. stages and a moving-coil loud speaker received a firm intimation that if he could not contrive to fit himself with a volume control he would be officially supplied with the very latest thing in muzzles!

To add to our troubles, during a great part of the time carpenters were at work in a neighbouring room putting up experimental and work benches in our new laboratory, and altogether it was as trying a time as even our worst enemy (if we have one!) could wish us.

You can imagine then what a relief it was when we decided upon a really neat solution of the problem which enabled us to scrap all our ingenious multiple-tuned crystal circuits, with their maddeningly critical tuning and ear-straining weakness of signals. That solution is really a very obvious one, once you have thought of it,



and is, in fact, no other than our old friend the Brookmans Receptor, which we have found such a valuable help in time of trouble.

Of course, one cannot merely fix an ordinary Brookmans Receptor on to a crystal set and have at once a perfect solution of the problem, because if you did that there would be the annoying job of re-setting the critical adjustment of the receptor every time you wanted to change over from one station to the other, a fact which explains why it was that we did not at first seek the aid of the receptor, but first of all explored the super-selective multiple-tuned circuits which gave us such a distressing time.

It was not difficult, however, to devise a receptor circuit which gets over this difficulty, and which is suitable for building into a crystal receiver, and this week we are presenting you with a fully worked out and carefully tested and approved design for such an outfit.

A Real Solution.

On test it has proved exceedingly satisfactory, enabling you to get really full strength signals by means of a perfectly normal type of receiving circuit, and to cut out one or the other of the stations at will in a most gratifyingly complete manner. It will do this, moreover, at even relatively short distances from the station, and seems to provide a complete answer to the poser set us by the second station.

We could not go so far as to guarantee that it will serve the purpose of those who live in the area of really acute frightfulness up



There is absolutely no mystery about the results set a standard is obtained without

- YOU BUILD IT—YOU

REJECTOR CRYSTAL SET

Why should the valve set owner have all the fun? This crystal set will separate two powerful programmes and give, not a maddening mixture of both, but the programme you prefer at the touch of a switch. It is a strikingly simple solution to an exceedingly difficult problem.

Designed and Described by
THE "P.W." RESEARCH DEPARTMENT.

to about three or four miles from the new station, but we believe that practically everywhere else it will enable the crystal user to obtain one or other of the two programmes entirely clear of interference from the unwanted one. It will, of course, only cut out one of the two stations, and will not remove them both for the purpose of enabling you to get 5 G B.

This, however, we do not consider to be a very serious drawback, because in our experience it is very rare for a crystal set in London to obtain a really satisfactory programme from 5 G B. To do so usually demands an exceptionally sensitive crystal set working under almost ideal conditions as regards aerial and earth. In the majority of cases only weak signals are obtained which are of little value, and so we do not feel that this is a serious objection. So long as the listener can obtain satisfactory alternative programmes from the two Brookmans Park transmissions we believe that he will be amply satisfied.

Simplicity and Strong Signals.

Now let us just explain briefly how the set is arranged to enable this to be done. First of all there is a perfectly simple and straightforward crystal receiving circuit, consisting of the coil L_2 , which is tapped for the purpose of enabling the aerial to be coupled to the tuned circuit, and the tuning condenser C_1 . Shunted across this is the crystal detector and 'phones, in just the normal manner. This circuit as it stands is not unduly selective, but it does give

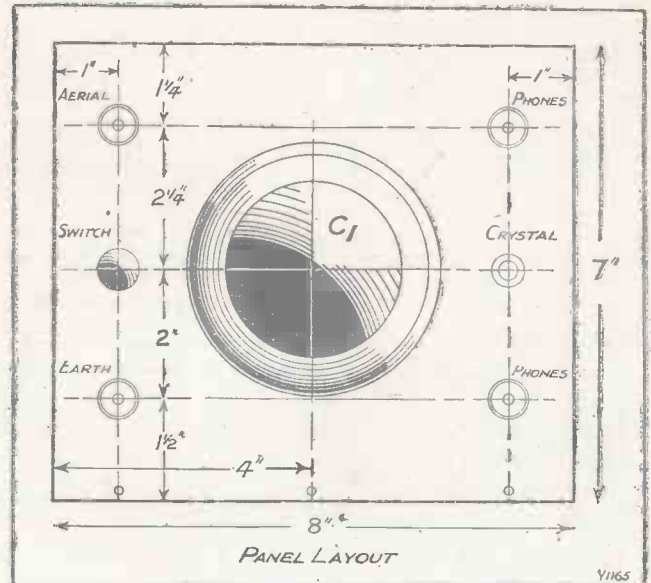
good strength. Then to enable you to deal with the interference problem there is a form of wave-change Brookmans Rejector consisting of the coil L_1 , the fixed condenser C_2 , and the two semi-variable condensers C_3 and C_4 , with a switching scheme to give the desired change-over action from the rejection of one station to the rejection of the other.

A Modified Rejector.

This rejection circuit is arranged slightly differently from those you have seen so far, in that the condenser C_2 which provides the coupling capacity between the aerial circuit of the receiver proper and the rejector circuit is fixed, having been set at a suitable value for general purposes.

Then, when the switch is in the open position, the rejector circuit is tuned by means of the condenser C_3 to reject the lower-wave transmission. To reject the longer-wave transmission—namely, the one on 356 metres—the switch is closed and condenser C_4 is adjusted until the desired cutting-out effect is obtained. Then by simply working the switch you can cut out either one or the other of the two waves as desired. The receiving set proper is thus left free to bring in the one station which you require, and is not swamped by the other one.

In spite of these little detail alterations, you will see that the rejector circuit is still quite simple, and has the usual No. 50 plug-in coil (which is marked L_1 on the diagram). The fixed condenser C_2 has a capacity of .0005 mfd., while C_3 and C_4 can be any of the well-known makes of semi-variable compression condensers of the baseboard-



As you see, it's beautifully easy—and a "peach" to operate, because there's only one dial to turn.

mounting type. For example, those in the original set were of the Igranite Pre-set type with a capacity of about .0008 mfd. Also suitable are the Radio Instruments type of condenser with a maximum capacity of about .001 mfd., and the Formo type G "Formodensator."

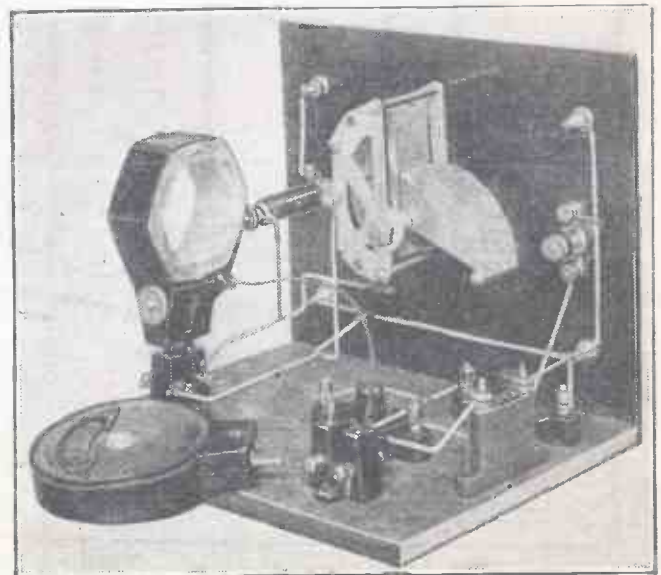
Another type of condenser which could be used is the Ready Radio "Brookmans" condenser, which has a maximum capacity of .00075 mfd. These latter are panel-mounting components, and so would require to be placed upon the panel of the set.

The Correct Coils.

The receiving circuit proper is so simple that we find it difficult to mention anything about it which would be of interest or assistance to you. We should perhaps just explain that you have a choice of two types of coil here. In normal circumstances we believe you will obtain the best results by using a centre-tapped coil of either size 50
(Continued on next page.)



at the construction. Standard parts are standard of their own, for amazing selectivity at any loss of volume!



You can use your present components (if of suitable types) but the results obtained from them will surprise you!

LISTEN—YOU SMILE!

THE REJECTOR CRYSTAL SET.

(Continued from previous page.)

or 60 Size No. 50 is to be preferred, since it brings the stations better on to the dial.

A No. 60 can be used at a pinch, providing that your tuning condenser is a good one with a reasonably low minimum capacity.

Where the aerial to be used is a particu-

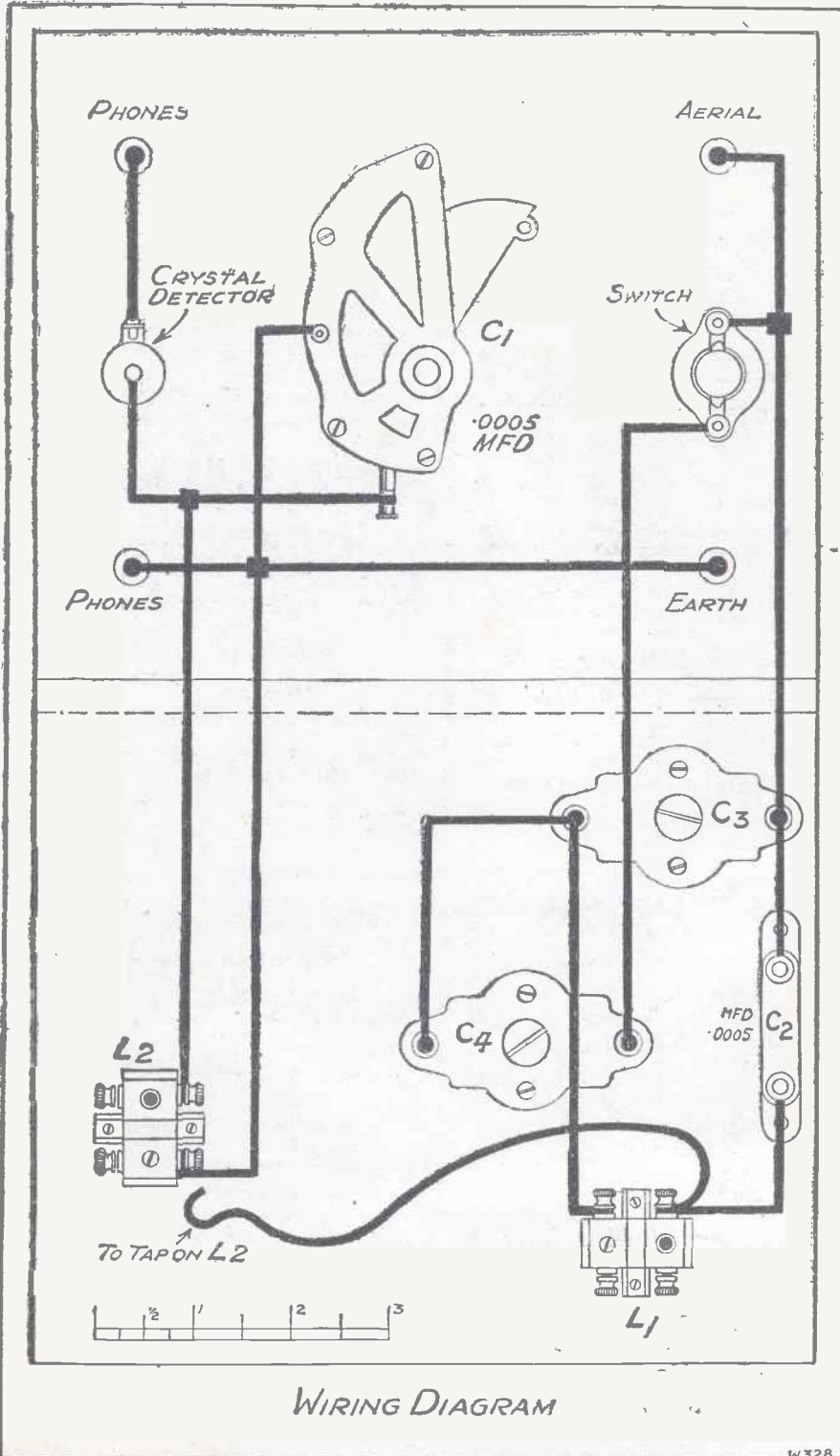
larly large one, by the way, the alternative type of coil is to be preferred, namely, one of the X type. If you should use an X coil, do not forget to try the effect of placing the flex lead on each of the two tappings in turn and see which gives you the best results. In the X coil type, a No. 60 size should be correct in all cases.

For the rejector circuit a No. 50 plain coil is the correct one to use; but at a pinch a No. 60 could be used here also, if you happen to possess one and do not want to buy a No. 50 for the purpose.

Now for some rather detailed instructions for putting the set into operation when first finished. Start with the switch in the off position, and the two condensers C_3 and C_4 set to their minimum capacity.

Now tune in the 356-metre transmission and get the detector properly adjusted for the greatest strength of signal.

Now tune down on the dial and see if you can pick up the 261-metre transmission, preferably doing this at some time when the 356 transmitter is either silent or transmitting speech, in order to make it easier to discriminate between the two. Now turn your attention to condenser C_3 and gradually increase its capacity until you find a point which causes the 261-metre signals suddenly to die down in strength and probably disappear altogether.



LIST OF COMPONENTS.

- 1 Panel 7 in. x 8 in. (Beol, Trelleborg, Trollite, Resiston, Paxolin, etc.).
- 1 Cabinet to fit, with baseboard 7 in. or 8 in. deep (Pickett, Camco, Gilbert, etc.)
- 1 '0005-mfd. variable condenser with plain dial (Lotus, Lissen, Burton, J.B., Cyldon, Keystone, Raymond, Igranic, Ormond, etc.).
- 4 Terminals (Eelex, Belling - Lee, Igranic, Burton, Clix, etc.).
- 1 On-off switch (Lissen, Lotus, Burton, Igranic, Raymond, Wearite, Ready Radio, Ormond, Benjamin, etc.).
- 1 Panel-mounting crystal detector, semi-permanent or cat's-whisker type (R.I., Brownie, Harlie, etc.).
- 2 Baseboard - mounting single - coil sockets (Magnum, Igranic, Lotus, Lissen, Keystone, Raymond, etc.).
- 1 Fixed Condenser, '0005 mfd (T.C.C., Lissen, Dubilier, Mullard, Igranic, Graham-Farish, Magnum, etc.).
- 2 Semi-variable condensers (Igranic, R.I., Formo, Ready Radio, etc.). (See text.)

Having done this, you will find that you can tune in the 356-metre transmitter on the dial of the condenser C_1 and get it entirely clear of interference. Now we want to be able to cut out this wave and receive the 261-metre station quite clearly. To do this close the switch and proceed to increase the capacity of C_1 gradually and carefully, until you find that the signals of the longer-wave station suddenly disappear, or at least go down to a very low value.

Having got this point, you will find that by turning your tuning dial back to the lower reading you will hear the 261-metre station come in loudly and clearly and without interference from the other wave.

After you have got these two adjustments on C_3 and C_4 , this is all you will have to do to hear one station or the other: To hear the lower-wave one, close the switch and tune to the necessary low dial reading on C_1 ; to hear the 356-metre station, open the switch and move C_1 round to the appropriate higher reading.

"I was particularly struck with the ingenious design of the Brookmans Rejector Circuit, because this method does appear to give the most efficient performance I have ever come across."
Capt. P. P. ECKERSLEY.

Ready Radio

FOR THE "MAGIC" THREE

OUR COMPLETE KITS ARE OFFICIALLY APPROVED BY "POPULAR WIRELESS"

- KIT A less valves and cabinet £6:13:0
- KIT B with valves less cabinet £8:6:6
- KIT C with valves and cabinet £9:16:6

All Kits include special Ready Radio connecting links.

Official Blue Print and full wiring and operating instructions free of charge with all kits.

NO SOLDERING REQUIRED!

EASY PAYMENTS NO DEPOSIT SYSTEM

COMPLETE SET "MAGIC" THREE

All parts as specified, including Valves, Cabinet, Short-Wave Coils, Ready Radio connecting links and official Blue Print with full wiring and operating instructions.

12 equal monthly payments of 18/3

CASH, C.O.D. or EASY PAYMENTS

A new addition to the well-known Ready Radio Service is our Hire-Purchase NO DEPOSIT SYSTEM for complete Kits of parts, etc., etc. Our close attention to customers detailed requirements and the well-known Ready Radio After Sales Service ensure complete satisfaction whichever way you buy.

Telephone No. Hop 5555 Private Exchange.

"MAGIC" FOUR

- KIT A less valves and cabinet £9:19:6
- KIT B with valves less cabinet £12:15:6
- KIT C with valves and cabinet £14:8:0

1 Set of Short-Wave Coils (20-50 metres) can be supplied separately if desired. Price 7/10. For full list of approved components see issue dated November 30th.

All kits include special Ready Radio connecting links.

NO SOLDERING REQUIRED

EASY PAYMENTS

All parts as specified, including Valves, Cabinet, SHORT-WAVE COILS, and Ready Radio connecting links.

NO DEPOSIT REQUIRED

12 equal monthly payments of 27/3

"MAGIC" TWO

- KIT A less valves and cabinet £4:17:0
- KIT B with valves less cabinet £6:0:0
- KIT C with valves and cabinet £7:2:6

(For full list of Approved Components see issue dated November 2nd.)

All kits include special Ready Radio connecting links.

NO SOLDERING REQUIRED

EASY PAYMENTS

All parts as specified, including Valves, Cabinet, Short-Wave Coils, and Ready Radio connecting links.

NO DEPOSIT REQUIRED

12 equal monthly payments of 13/3

READY RADIO IMMEDIATE DESPATCH SERVICE

When you buy radio parts you naturally want them quickly. You also would be happier with the knowledge that in the event of subsequent difficulties you can obtain technical advice without trouble.

TO HOME CUSTOMERS

Your goods are despatched post free in sealed cartons or carriage paid by rail. Note.—You can if you desire avail yourself of the C.O.D. system.

TO OVERSEAS CUSTOMERS

All your goods are very carefully packed for export and insured, all charges forward.

Ready Radio

FOR THE REJECTOR CRYSTAL SET

DESCRIBED IN THIS ISSUE.

PRICE LIST OF PARTS

	s.	d.
1 Ebonite panel 8" x 7"	3	0
1 Baseboard 8" x 7"	1	9
4 Belling Lee inscribed terminals	1	0
1 On-off switch	1	0
1 Panel mounting crystal detector	2	6
1 Lotus '0005 variable condenser	5	9
1 Plain dial	1	0
2 Ready Radio variable condensers, '00075	7	0
2 Coil sockets	1	4
1 '0005 fixed condenser	1	0
2 Lewcos coils, 50 C.T.	7	0

Total (Including Coils) **£1.11.4**

BROOKMANS TWIN-WAVE REJECTOR

COMPLETE KITS AVAILABLE FOR IMMEDIATE DESPATCH

KIT A WITHOUT COILS £0:18:3

KIT B INCLUDING COILS £1:6:6

BROOKMANS TWIN-WAVE CONDENSERS

SET OF 3 CONDENSERS AS USED IN THE ORIGINAL **10/6**

These condensers enable you to obtain the fine control essential for the ELIMINATION of EITHER or BOTH Brookmans Park stations.

Ready Radio

Telegrams: Ready Hop 5555 London.

159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1

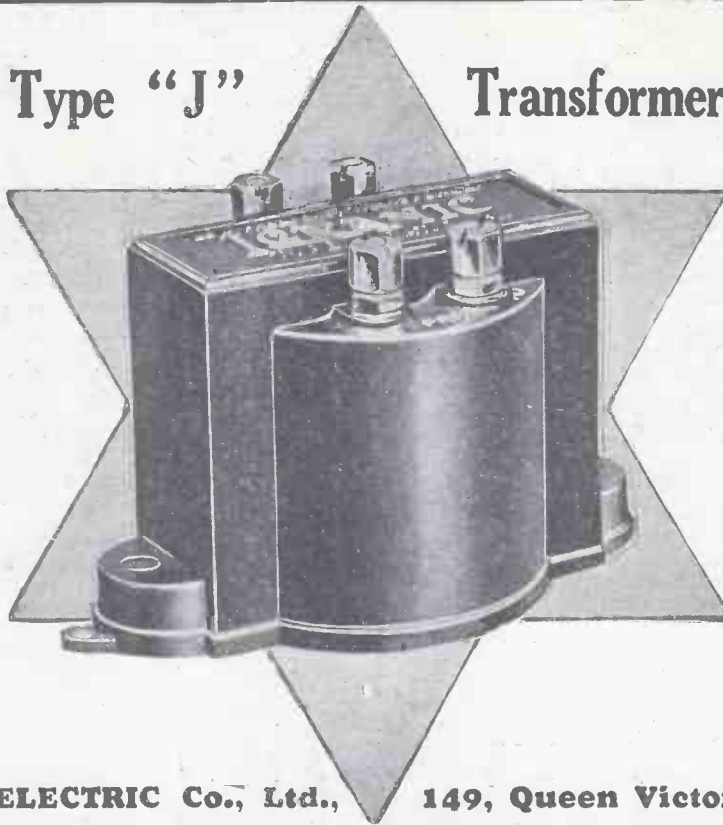
(Three minutes from London Bridge Station.)

LOW FREQUENCY PURITY

Type "J" Transformer

PRICE
17'6

PRICE
17'6



Small, neat and handsome, but with a straight line performance and a purity and constancy of amplification far above any transformer in its price or class. Use it and enjoy truly magnificent magnification.

Obtainable in two ratios 3-1 and 6-1. Ratio 3-1 for valves with impedances of 10,000-20,000 ohms. Ratio 6-1 for valves with impedances of 5,000-10,000 ohms.

Apply to your dealer. If he cannot supply you, please write at once to Dept. R.140.



IGRANIC ELECTRIC Co., Ltd.,

149, Queen Victoria St., LONDON



THE DECIDING FACTOR

No. 101
Price 2 Gns.

No. 97b. Price 15s.

THE deciding factor in radio reception is the speaker. All the care that is taken by others in broadcasting and by yourself in using a good circuit will be wasted if your speaker is a poor one.

Therefore we ask you to take the first opportunity of hearing a Squire 101 Speaker with a good Unit. We definitely claim that the quality of reproduction afforded is equal to, if not better than, that of the most expensive Speaker on the market.

The No. 97b, also shown here, with a cone of the latest climate proof vellume type and constructed of solid casted aluminium, absolutely preventing chatter, will take any Unit at present on the market.

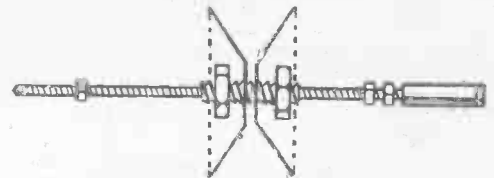
FREDERICK SQUIRE LTD.

10, Leswin Place, Stoke Newington, N.16.

FOR THE

LINEN-DIAPHRAGM SPEAKER

THE "HOLDFAST"



1/-

BY POST
EXTRA

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PLEASE STATE THE TYPE OF UNIT THAT THE "HOLDFAST" IS REQUIRED TO FIT.

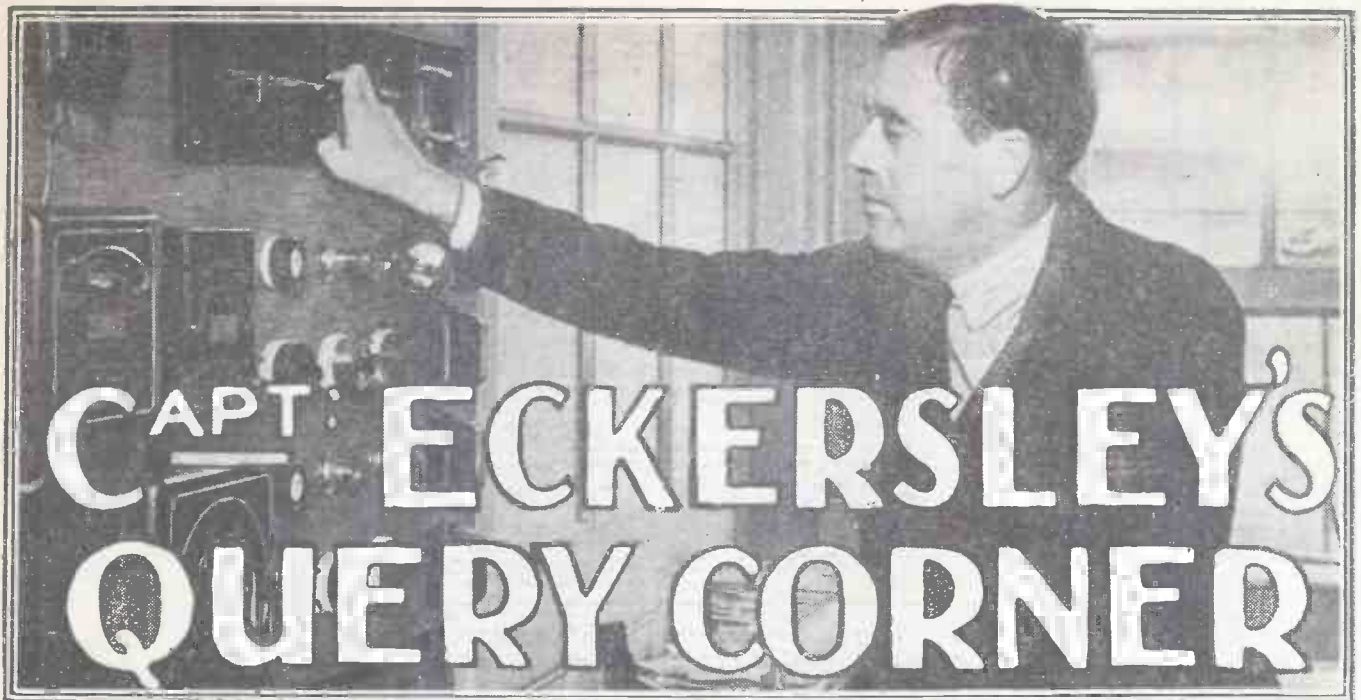
CATALOGUE—FREE

BY POST 6d.

WILL DAY LTD.

19, LISLE STREET,
LEICESTER SQ., W.C.2

'PHONE: REGENT 0921-22



A Puzzling Fault.

J. E. (Greenhithe).—"I am experiencing a puzzling fault in my two-valve set. Signals are received at good strength for a quarter of an hour or so, and then gradually fade away, as if something is becoming choked. If the set is switched off for a while and then switched on again, reception is quite normal, but after a while fades away again, and so on. What is the trouble?"

Surely a run-down battery that gets tired after it's been working. Batteries are just like people when they're run-down; they can do good work for a little while, but they soon feel faint and have to give up.

An Aerial Problem.

R. J. (Peckham).—"It is possible for me to get a 30-ft. long and 30-ft. high aerial in my loft. Would this be just as efficient as an outdoor aerial of the same dimensions?"

Yes! but what about the earth? You'll possibly find that if you run an earth to the set from the ground or (same thing) on to your cistern (which is usually put in the loft so that plumbers can get a job in the winter!) you will get weaker signals than if you leave off the earth.

You could try using the water pipes as an aerial, and quite likely it'll work. Erect your aerial, get an earth to the pipes, and try all sorts of permutation and combinations. (If your set works off the mains, you must use the earth connected to the earth terminal.)

Overcoming "Fading."

J. B. J. (Chorlton).—"Is the transatlantic 'phone service worked by Beam radio, and if so, why is it that short-wave Beam signals do not fade?"

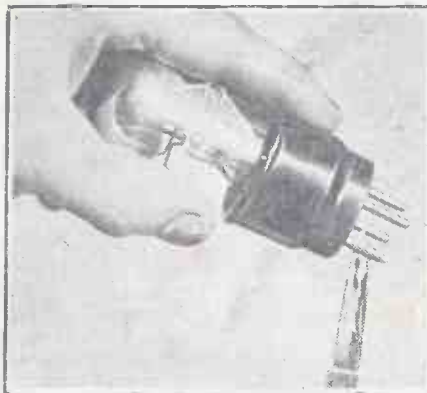
At certain times, depending upon conditions, short waves are used for transatlantic work. Elaborate precautions are taken at the receiver to prevent fading.

Provided the transmitter is stable and modulation conditions are satisfactory, the whole problem of short-wave linking is

Under the above title, week by week, Capt. P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, will comment upon radio queries submitted by "P.W." readers. But don't address your queries to Capt. Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

bound up in erecting a receiving system which gets over fading. This is most commonly done by erecting either a Beam aerial which consists of many aeriels, the furthest apart of any two being less than

A VALVE TIP.



If your valve has split pins, contact can often be improved by opening them occasionally as shown. But don't let the knife slip on to your thumb

a wave-length apart, or aeriels spaced even miles apart.

It isn't so much a question of the receiving set as the aerial system, and Beam aerial systems as used by the Marconi Co. are

excellent for the purpose not only of overcoming fading but also background noise.

The Marconi Mathieu system telephones as well as telegraphs on the same aerial.

Getting Sharper Tuning.

J. M. (Acton).—"I am using a 'det. and two L.F. circuit,' with which I am not able completely to separate the transmissions of 2 L O and 5 G B.

"The interference is not very bad, however, and I am told that I could improve matters by using a counterpoise earth. Is this so?"

A series aerial condenser is by far the best cure. This will sharpen up your resonance curve considerably, but will mean a slight reduction in signal strength from 5 G B.

Is It the Valve?

L. H. (Chatham).—"I have a three-valve set consisting of a detector and two L.F. stages (transformer coupled). When the receiver is working there is a continual 'frying' noise, which disappears when the first L.F. valve is changed for another. Does this indicate a faulty valve?"

Yes. A bad contact on the valve prongs might, however, be the cause, in which case try pulling the valve up and down in its holder a time or two to clean the contacts.

If this does not cure the trouble, the internals of the valve are wrong.

An On-Off Howl.

N. C. (Somerset).—"Whenever I switch my set off or on, I hear a loud howl which dies away in about a second. Is this likely to be affecting my results?"

No! I should think it's just the filaments getting hot, and the set howls when they're warm enough to give some amplification, but not warm enough to bring in the requisite dampings. I think it's all right but you are a better judge than I can be, as I haven't heard the results.

BOTHER WITH THE NEWS BULLETINS

By
A MAN WHO
READS THEM

The arduous nature of the preparation and broadcasting of the News Bulletins is intimately portrayed by a B.B.C. Announcer in this fascinating article.

TO most people, the broadcasting of news bulletins must seem the simplest function of the B.B.C. Apparently, the news is simply read twice a day, and that is all. In reality, however, a vast amount of care goes to the make-up of each bulletin.

The news is sent direct to Savoy Hill by Reuters, the famous news agency, who have gathered it from all the other agencies, who, in their turn, have received it direct from correspondents and pressmen in all parts of the world.

Very Carefully Edited.

Not all news, however, is suitable for broadcasting. After we people at the B.B.C. have received the typewritten sheets, they have to be carefully examined, for references to divorce cases which may shock spinster ladies in the suburbs and sordid details of murder cases are not generally acceptable.

Such things have to be deleted, and the MS. is then re-typed in order that the Announcer can handle it without undue bother.

Personally, as one of this unhappy band, I found reading the news a most arduous duty. In fact, I might truthfully say that it haunted me long before I faced the microphone and commenced the actual reading.

Every item had to be carefully read, doubtful words looked up, and their pronunciation as advised by the Advisory Committee rehearsed.

Then, when I eventually faced the "mike" and sat at the desk in the small studio with the MS. before me, I had to read each sentence in a carefully modulated voice, taking care to report such controversial subjects as politics without bias.

If Bolton Wanderers won a football match while I supported West Ham, I had to carry on and report the failure of my favourite team without a trace of disappointment in my tones. No easy job, that!

Personal Bulletins.

Nor are the news bulletins so matter-of-fact as some people may think. On many occasions, they have assumed a positively personal note.

Last summer, for instance, I well remember wishing Delius, the composer, many happy returns of the day, and a colleague

of mine has frequently expressed the B.B.C.'s Birthday Greetings to the King, on the occasion of his birthday. Even drama and tragedy have sometimes crept into the bulletins.

Some time ago, a resident of the island of Saint Kilda died whilst visiting the mainland, and owing to a high wind and the turbulent state of the sea, it was found impossible to get into touch with the Islanders.

But, although Saint Kilda has no telephones, it has several wireless sets. So the information was conveyed through the microphone!

At other times, the Shipping News has been instrumental in saving life at sea by informing mariners of the approach of foul weather.

But if the news bulletins are sometimes dramatic, they are often humorous as well. I have mentioned the care with which one rehearses before reading but, on several

One Announcer came out with the amazing statement, "Last night, the temperature was eleven degrees below Zero!"

Listeners must have sat up and taken notice at this revelation of Polar conditions in England, but, happily, the Announcer corrected his error. He should have said "Eleven degrees of Frost"—a very different thing.

Then there was the man who, faced with the figure 7,738,000,000 interpreted it as seven million, seven hundred and thirty-eight million!

A Flood of "Lager."

Another time, when speaking of an eruption of Mount Etna, it was said that the "lager" was still pouring down the mountain side.

Every uncorrected mistake, of course, always results in a flood of letters and this indicates the keen manner in which wireless fans listen.

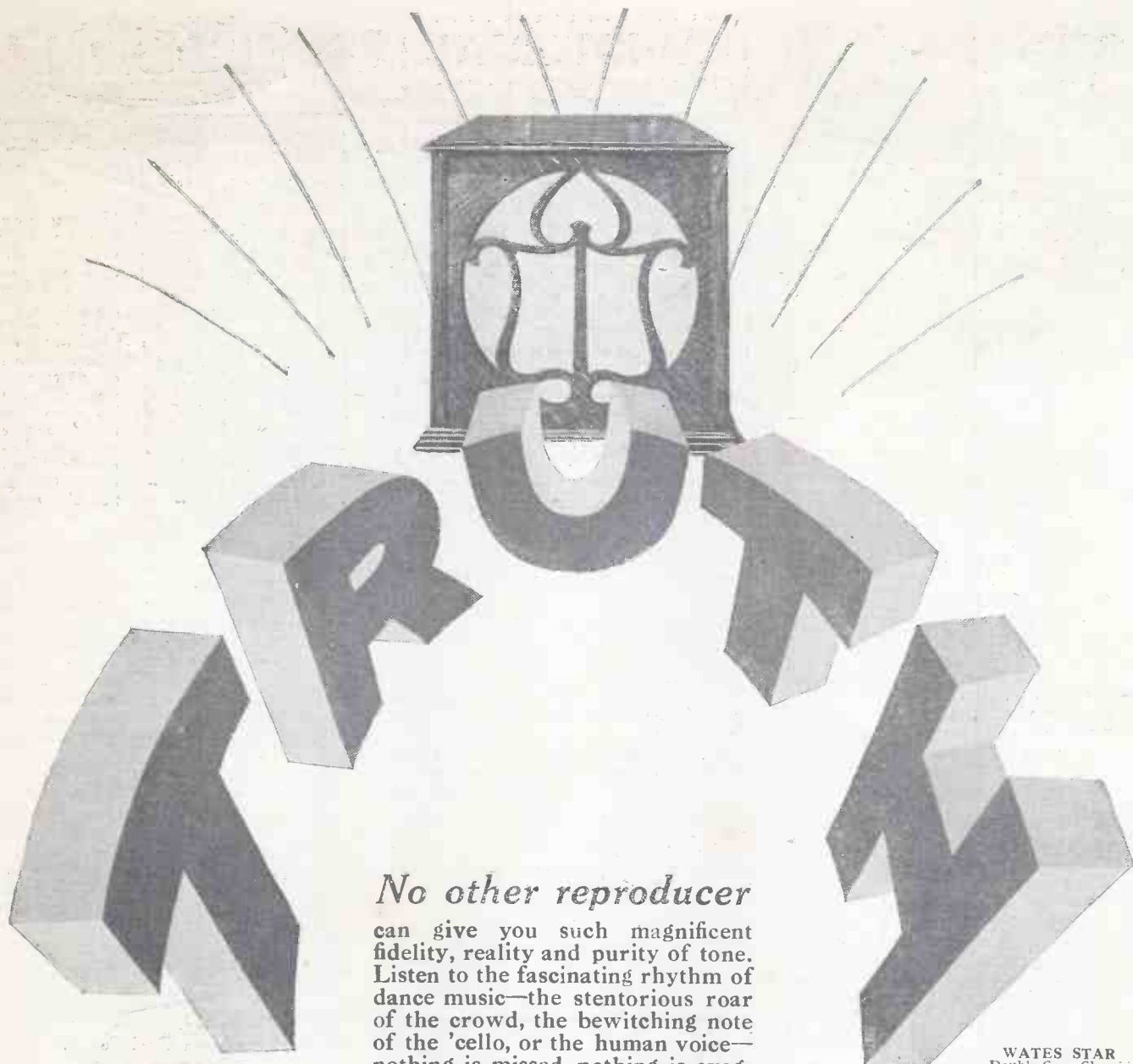
Indeed, a short time ago, one of my colleagues was seized with a fit of coughing



Some of the apparatus used at the Horse Guards Parade for the dissemination of broadcast news to the public during the General Strike.

occasions, brother announcers have stumbled over a word, term, or sentence, often with the most amusing results.

whilst half-way through the bulletin. By the next post, a dear old lady sent him a prescription for a cough cure.

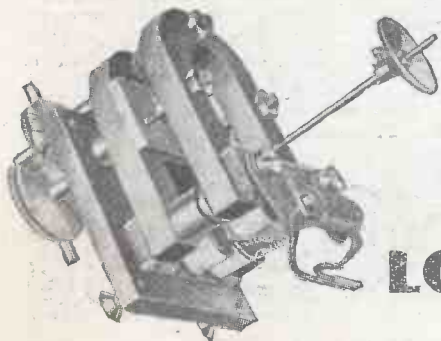


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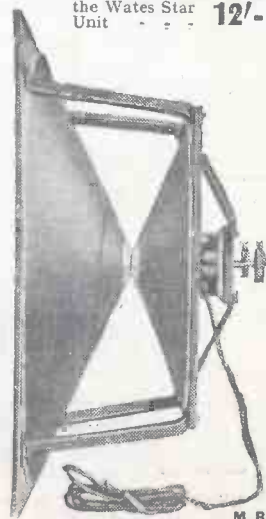
can give you such magnificent fidelity, reality and purity of tone. Listen to the fascinating rhythm of dance music—the stentorious roar of the crowd, the bewitching note of the 'cello, or the human voice—nothing is missed, nothing is exaggerated, you hear only the truth! Hear it at your dealer's. Fully descriptive literature sent free on request.

WATES STAR
Double Cone Chassis
(Patent No. 309214)
with brackets, specially
designed for use with
the Wates Star
Unit - - - **12/-**

Complete Speaker in
Cabinet
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MAHOGANY - £4.6.0
WATES STAR UNIT
12 poles. Double Magnets.
4 coils. Upper adjustment
for magnets, lower
for amature - - **36/-**



**WATES
STAR
LOUD SPEAKERS**



THE SHAFTESBURY RADIO CO. (Dept. P.W.)
184/188, Shaftesbury Avenue, LONDON, W.C.2



COMPLETE ASSEMBLY

with which you get the nearest possible approach to moving-coil tone and fine full volume without chatter. Ready for use or to mount in a cabinet. PRICE

22/6

You can build any type of cone loud speaker with the Lissen Four Pole Adjustable Balanced Armature Unit; you can use it with a big baffle board, or put it in a cabinet. You can build a linen diaphragm loud speaker with it. It has a fine adjustment, and you therefore get the utmost volume from it without chatter.

In brown moulded case with attachment for fitting to any type of cone. PRICE **12/6**
Cast Aluminium Chassis PRICE 7/6 13 in. Cone 2/6

CURRENT FROM THE MAINS BETTER THAN BEFORE



27/6

D.C. MODEL "A." 110-250-v. Cash price 27/6, or 5/- down and 5 monthly payments of 5/6.
D.C. MODEL "B." 110-250-v. Cash price 39/6, or 5/- down and 8 monthly payments of 5/-.
A.C. MODEL "A." 100-110, 200-210, 220-230, 240-250-v. Cash price 60/- or 5/- down and 10 monthly payments of 6/6.
A.C. MODEL "B." 100-110, 200-210, 220-230, 240-250-v. Cash price 75/- or 5/- down and 10 monthly payments of 8/-.

RADIOTORIAL.

All Editorial communications to 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. Lillie, 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 specialities described may be the subject 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.

HOW TUNING AFFECTS REACTION.
G. S. M. (Worcester).—"Although my new set employs what I believe is called 'Reinartz' reaction (that is, using a condenser, instead of a moving coil like the old one), I notice the same peculiarity here as formerly. If I increase the tuning so as to look for higher wave stations, I have to increase the reaction to keep the set sensitive. If, on the contrary, I turn downward to look for Moravskaostrava, or one of the lower wave-length stations, the set tends to oscillate unless I slacken off reaction a little.
"Is this a peculiarity on all sets, or have my experiences been unusual?"
It is usual to find on ordinary broadcasting wave-lengths that when the tuning condenser is turned upwards, to bring in higher wave-length stations, this

"P.W." TECHNICAL QUERY DEPARTMENT

Is Your Set "Going Good" ?
Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?
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 free and 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 in person at Fleetway House or Tallis House.

automatically decreases the effective amount of reaction being applied, and therefore the reaction has to be advanced towards the maximum position.
When tuning to lower wave-lengths, on the contrary, the effect is automatically to *increase* the reaction, so that the reaction control must then be turned towards minimum if the set is to be kept well below the oscillation point. It is because this happens that the experienced operator tunes with one hand on the tuning dial, and the other on reaction, varying them simultaneously to keep the set in its most sensitive condition.

VALVES FOR "MAGIC" THREE.
H. C. R. (near Letchworth, Herts).—"It was called the 'Magic' Three, and I was so charmed with the results that as soon as I
(Continued on next page.)

LISSEN



Wherever you see an H.F. Choke specified, there you can put a Lissen H.F. Choke. The growing popularity of Reinartz and other capacity reactive circuits has been reflected in the enormous demand for Lissen H.F. Chokes. Suitable also for all H.F. amplification circuits. Hermetically sealed in moulded insulating material. PRICE **5/6**
For Short Wave work **7/6**

Obtainable of all dealers.

DELIVERS ALL ITS STORED UP ENERGY



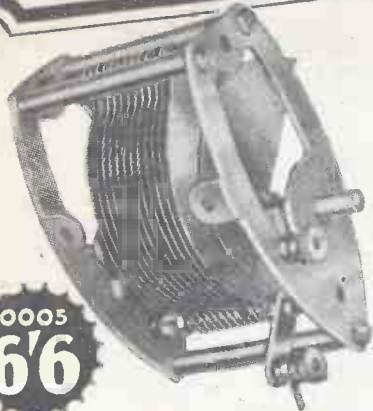
When you buy a Lissen Fixed Condenser you can be sure that it will never leak, never vary in capacity, never break down in use, and will deliver all its stored-up energy all the time.

LISSEN GRID LEAKS
These are resistances that never vary; they are absolutely silent in use, and their values remain unchanged. All values, each **1/-**
With Terminals, 1/3 each.
For whatever purpose you require a fixed condenser—whatever circuit you are building, and no matter what is specified—use Lissen with absolute confidence. They are accurate to within 5% of stated capacity, and will remain constant throughout the life of the receiver.
'0001 to '001 - 1/-
'002 to '006 - 1/6
'01 - - - 2/-

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A.C. or D.C.
ELIMINATORS
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LISSEN
FIXED MICA
CONDENSERS
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LISSEN LOW-LOSS VARIABLE CONDENSER



0005
6'6

- 0001 mfd. capacity - 5/9
- 0002 mfd. capacity - 6/-
- 0003 mfd. capacity - 6/-
- 00035 mfd. capacity - 6/3
- 0005 mfd. capacity - 6/6

The new Lissen Variable Condenser enables you to enjoy a new standard of tuning—a new sense of smooth control—a new ease in separating stations close together—*simply because there is no condenser loss, and incoming signals are retained at full strength.*

See the unmistakable rigidity of its construction; see the long bearing and the extended spindle for ganging purposes. Notice that there is no end pressure; no tendency to distortion of the vanes. The fixed vane terminal is in a new and convenient position well away from the end plates. There are feet for base-board mounting, or standard one-hole fixing for panel mounting.

LISSEN, LIMITED,
Worples Road, Isleworth, Middlesex.

LISSEN WIRE WOUND RESISTANCES



Contained in hard insulated tube; heavy end caps for direct attachment to wires, if preferred to using clips; wound with special wire with large current capacity; small self capacity; particularly suitable for use in H.T. circuits as well as L.F. amplifiers; enables the high tones (which are usually shunted and rendered inaudible by ordinary resistances) to be passed on to the next valve without loss.

Ohms	Price	Ohms	Price
2,500	3/6	50,000	3/6
5,000	3/6	60,000	4/-
10,000	3/6	80,000	4/-
15,000	3/6	100,000	4/6
20,000	3/6	150,000	5/6
25,000	3/6	200,000	6/6
30,000	3/6	250,000	6/6
40,000	3/6	500,000	15/-

LISSEN Resistance Base.

Provided with clips for mounting resistances. Can be mounted vertically or horizontally on baseboard or panel.

Price 1/-



LISSEN, LIMITED,
Worples Road, Isleworth, Mdx

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

came home again I endeavoured to build the set. My uncle's was a 2-volt accumulator, but on making enquiries I find that it is generally considered that 6-volters are best.

"What H.T. and what valves do you recommend for the 'Magic' Three?"

As a matter of fact this set is not one of those which show up the difference between 2-volt and 6-volt valves very much, so you need not be afraid to use the economical 2-volters, for the results will not fall short of your expectations.

For the detector you want a valve of the H.F. type, which usually has an impedance of from 20,000 to 30,000 ohms, or thereabouts. Any of the well-known makes of H.F. valve, with an impedance as above stated, will give you good results in this position.

In the first L.F. stage (second valve socket) you want either a valve of the same type as before, or one of the "L.F." or "G.P." type. These latter usually have an impedance of 10,000 to 18,000 ohms.

The H.F. type used in the two sockets is rather better where distance is considered to be of the greatest importance. One H.F. and the L.F. or G.P. type in the second socket generally give slightly better quality on really powerful signals, such as those of the local station, 5 GB and 5 XX, and so enable you to handle slightly more volume without overloading.

For general purposes, however, we recommend both valves being of the H.F. type, as there is little risk of

WHAT DO YOU THINK ABOUT THIS?

A Birmingham reader of "P.W." had a Det.-L.F. set which gave good loud-speaker reception for the first few months, and then suddenly went weak and distorted.

H.T., G.B., and L.T. voltages were O.K. when tested with reliable voltmeter.

Aerial and earth were proved O.K. Battery leads, loud-speaker leads, and all wiring inside set tested for continuity—all O.K.

The Valves, tested in a friend's set, worked perfectly.

WHERE WAS THE FAULT?

N.B.—There is no prize for answering this, but week by week we shall give a radio problem (followed the next week by the answer), in the hope that readers will find them both amusing and instructive.

(Look out for the solution to above next week.)

overloading them unless you are trying to get tremendous volume with a very large super-power valve in the output.

For the last stage, namely, the third socket, you want as large a power valve as you think your H.T. battery is capable of supplying in an economical manner. The set gives so much volume that a super-power valve can be employed, but as this requires a lot of current, we only recommend a super-power valve where H.T. is taken from the mains, or from very large capacity dry batteries or H.T. accumulators.

For ordinary H.T. batteries an ordinary power valve is perfectly satisfactory for V3, and you get a reasonable long life from the battery. With each valve you will get a curve showing the correct grid-bias to apply for various H.T. voltages, and this should be followed as a guide, to make sure that the set is working under its proper conditions.

The H.T. voltages are very simply arranged. Connect up the H.T. negative terminal to the negative socket of the battery, and take a lead from H.T.+1 to a tapping at about 60 volts. The H.T. +2 terminal supplies the two L.F. valves, and here you really want about 120 volts, although less will serve at a pinch.

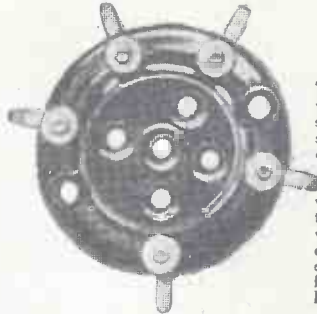
If you have it available, go right up to the maximum voltage permitted by the makers for your valves. (Usually about 140 or 150 volts is allowed.)

MORE "MAGIC" THREE INQUIRIES.

G. E. L. (Borden; Hants).—"I tried to get the back number, but I am informed that it is out of print. Could you tell me the main points about the 'Magic' Three—about

(Continued on next page.)

LISSEN NEW 5 PIN UNIVERSAL VALVE HOLDER



The latest in valve-holder design and construction. Recent valve developments call for 5-pin valves, and this tendency will without doubt be extended. Save expense by fitting 5-pin holders now.

Exceptionally strong, with springs entirely independent and cannot short circuit. A glove-like fit to any standard valve, with positive terminal connection to valve pins.

PRICE **1'3** BROWN Moulded Case

BUILD UP PURITY WITH LISSEN R.C.C. UNIT



Lissen Resistance Capacity Coupling Unit embodies a '01 Lissen Fixed Condenser, which is leak proof and unvarying in capacity and which delivers all its stored-up energy. There is therefore no loss of volume, no loss of purity. The Lissen Fixed Resistances are silent; they never vary, no matter what the current load.

Values incorporated have been selected as the most suitable for general use, but the resistances are easily interchangeable. May be mounted upright or flat.

PRICE **4/-**

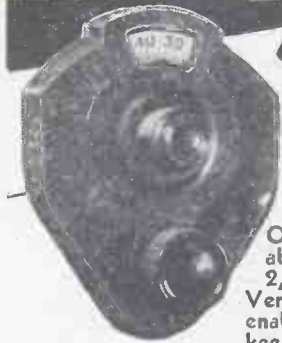
LISSEN FIXED CONDENSERS

Leak-proof, accurate. Deliver all their stored up energy.

0001 to	1/-
001 ..	
002 to	1/6
006 ..	
01 ..	2/-

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Worples Road, Isleworth, Middlesex.

DOMINION VERNIER DIALS



Only Brownie's ability to produce 2,000 Dominion Vernier Dials a day enables them to keep the price as

low as 2/6. The special non-backlash design (for fine tuning) and the splendid finish (smooth black or beautifully grained mahogany bakelite) coupled with the low price, makes the Dominion Vernier Dial a real radio bargain.

BROWNIE WIRELESS COMPANY (G.B.) LIMITED, NELSON STREET WORKS, LONDON, N.W.1

BROWNIE WIRELESS

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

reaction, setting on the potentiometer for best results, coils to use, etc."

The following is a summary of the chief points about this receiver's controls, etc.:

WORKING DATA IN BRIEF.

1.—H.T. VOLTAGES : Detector is supplied by H.T. + 1 terminal, for which plug-in from about 40 to 60 volts, adjusted for smooth reaction. Terminal H.T. + 2 feeds the L.F. stages and should be given about 120 volts for best results on loud stations.

2.—COILS : Tuning coil should be a No. 60 X for ordinary wave range and a No. 250 X for long waves. Reaction coil should be a No. 35 or 50 for ordinary waves, and a No. 75 or 100 for long waves. For short waves, use a No. 4 for tuning and a No. 6 for reaction for 20- to 40-metre band, and a No. 6 and No. 9 for 40 to 60 metres.

3.—VALVES : 2-, 4- and 6-volt types all work well in this receiver. Suitable types are : Detector, H.F. type of about 20,000 ohms. First L.F., similar valve or one of L.F. or G.P. type of from 10,000 to 18,000 ohms impedance. Third valve, power or super power.

4.—SELECTIVITY CONTROL : Two different degrees of selectivity can be obtained by placing the flex lead on one or other of the tapping points on the "X" coil. (The one giving the best selectivity usually gives slightly less volume.)

5.—REACTION CONTROL : To get perfectly smooth reaction adjust H.T. on detector suitably, and set potentiometer arm carefully. Try to keep it as far round towards positive end (nearest grid leak) as possible, without making reaction "ploppy."

If there are "flat spots" on the reaction on short waves, transfer aerial lead to A₁, so bringing small series condenser into circuit. Keep this at maximum if possible, but try other settings if necessary.

6.—LOUD-SPEAKER CONNECTIONS : With ordinary power valve loud speaker can be connected to L.S. terminals of set in its original form. With a super-power valve it is better to use an output filter, either as a separate unit or built into the set.

7.—KEY TO CONTROLS : Left-hand knob is reaction, which INCREASES by turning to right (clockwise). Use this sparingly and keep at minimum (turned to the left) for local station. Middle knob (large dial) is the tuning control. Lowest waves of each range by turning to the left (anti-clockwise) and higher waves by

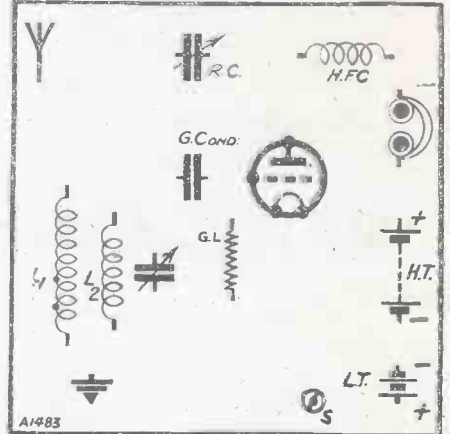
turning to the right (clockwise). Small knob at right-hand end of panel is the on-off switch.

NOTE.—On the "de luxe" version, incorporating refinements described in later issues there is another small knob near the middle of the panel. This is the volume control.

NEVER ALLOW THE SET TO OSCILLATE.

POPULAR "WIRELETS"

(No. 1).

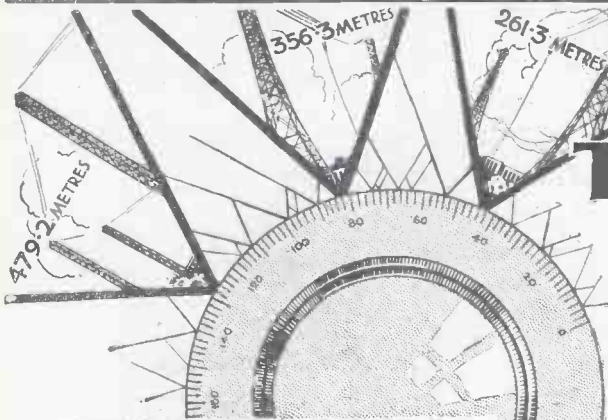


Can You Fill in the Lines ?

Here are the "components" for a 1-valve set: [Detector (grid-leak method), with condenser-controlled reaction.]

Suppose you needed a perfectly straightforward but selective circuit, how would you connect these "components" together?

Look out for the answering diagram in next week's "P.W."



WIDE TUNING RANGE

Because Polar Condensers are scientifically designed—have accurately spaced vanes and low minimum self capacity—they give you a definitely wider range of tuning.

There is no need to sacrifice listening to 5 GB (479 metres) because you want Brookmans Park (261 metres) transmission. The Polar "Ideal" or Polar "No. 3" Condenser of .0005 capacity will tune them all in on any standard circuit receiver.

Polar Condensers give velvet smooth control, and the "Ideal" with both Fast and Slow motion gives knife-edge selectivity. Both the Polar "Ideal" and "No. 3" will make a wonderful difference to your range of reception.

POLAR "IDEAL" .0005, 12/6. POLAR "No. 3" .0005, 5/9.
.0003, 12/-. .0003, 5/6.

POLAR CONDENSERS

Obtainable from all Dealers. Write for Free Copy of "Polar" Catalogue (P).

WINGROVE & ROGERS, LTD.,
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Polar Works : Mill Lane, Old Swan, Liverpool.



—CURRENT— FOR YOUR MOVING-COIL SPEAKER.

The comparatively heavy supply demanded by the pot magnets can be very easily obtained from your A.C. house mains with the aid of



WESTINGHOUSE

METAL RECTIFIER.

Full particulars, and circuits, showing how to use all types of Westinghouse Metal Rectifiers, are given in our 32-page book "The All-Metal Way, 1930." It includes a chapter of useful information on the running of moving coil speakers from the mains.

The Westinghouse Brake & Saxby Signal Co., Ltd.,
82, York Road,
King's Cross, London, N.1

Send 2d. stamp for a copy.

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Recommended for the NEW HIGH POWER STATIONS

Price **2/-**
Each

12 feet long. Superior to Frame Aerials and other Indoor Aerials at double its length. Made up of 96 Plaited Wires. Light, Flexible and Efficient. Refuse substitutes. Full particulars with large radio catalogue on request.

WARD & GOLDSTONE, LTD., Pendleton, Manchester

The last of the programme is not always the least—make that extension to the bedside with

"HARBROS" EASYFIX PATENT EXTENSION FLEX AND HEAR IT OUT TO THE END.

If your Dealer is out of stock send direct to :—
HART BROS. ELECTRICAL MFG. Co. Ltd.
4, QUEENSWAY, PONDERS END, MIDDLESEX

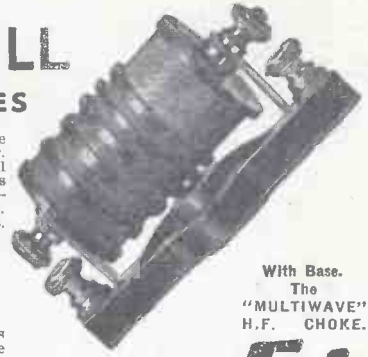
Some amazing figures!

Report of test by the FURZE HILL LABORATORIES

A thorough test was made of the Graham-Farish H.F. Choke by Mr. Resmer of the Furze Hill Laboratories. The following figures are extracted from his report:—

Wave length.	Impedance.
200 metres.	43,500 ohms.
245 "	50,000 "
380 "	80,000 "
480 "	147,000 "
500 "	150,000 "
880 "	255,000 "
1,460 "	385,000 "
2,400 "	126,000 "

The Graham-Farish H.F. Choke was designed to obtain high impedance with low D.C. resistance, and these figures will show the success that has been achieved by careful research and scientific design.



With Base.
The
"MULTIWAVE"
H.F. CHOKE.

5/-



2/3
each

The famous "OHMITE"—a moulded Anode Resistance with a value that remains constant. Infinitely better than wire-wound. Hermetically sealed in Bakelite. Noiseless and efficient. Negligible self capacity, so that the high notes are retained. Also fitted with terminal ends. All values, 1,000 to 500,000 Ohms. Holders, Horizontal or Vertical, 6d. each



4/6
each

The New "MICRO-FICIENT" Condenser, a brass-varved log-mid-line variable condenser using Bakelite as a dielectric. Robust in construction, and ideal for portable sets. Can be mounted for either drum or ordinary dial control.

.0005 mfd.	4/6
.0003 "	4/3
.00015 "	4/3

GRAHAM FARISH

BROMLEY



KENT

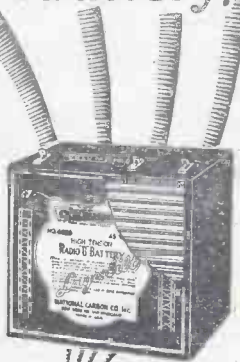
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

"Layerbilt" - every inch a battery!

Every inch of the "Layerbilt" Battery is a store of electricity: The Columbia patented process of building layer upon layer of flat cells gives "Layerbilt" 1 1/2 times the electrical capacity of any other battery of equal size and weight. The increase in its life is even greater. "Layerbilt" is the best and most economical battery in the world.

Buy "Layerbilt" now - don't risk spoiling your programme with exhausted batteries.

25/-



"Layerbilt" No. 4186 for 18 m/a, 25/-
No. 4780, 60 volts, 20/-
No. 4721, 60 volts, 10/6
No. 4755, 60 volts, 18/-

Columbia RADIO BATTERIES

J. R. MORRIS, Imperial House,
15, Kingsway, London, W.C.2.
Scotland: J. T. Cartwright, 3, Cadogan St., Glasgow.

Tested and Found-?



THE MULLARD L.F. TRANSFORMER.

THAT there must be much more in a modern L.F. transformer than "meets the eye" will be obvious to the most inexperienced of "P.W." constructors.

If this were not the case, how could the Mullard "Permacore" Transformer do its mightily effective work, for it is only a little chap enclosed in a plain, if neat, and attractive little casing?

The truth is, of course, that it is "compact progress." Its small core is fashioned of special alloy and can do more than those large masses of iron that figured in such devices a few years ago.

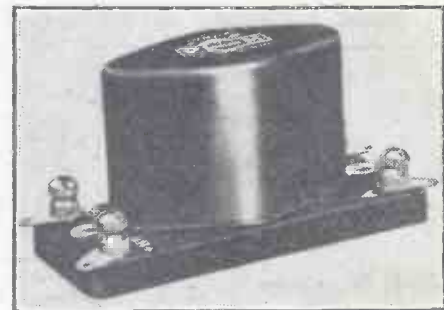
Then the primary winding is composed of silver wire and the secondary of nickel instead of plain copper. The ratio is 1-3,

and a very high primary inductance is achieved.

The Mullard Transformer follows one of those fine Mullard D.X. detectors remarkably well and such forms indeed a notably powerful combination.

Constructors will appreciate the inclusion of two holding-down screws with each Mullard transformer. It is little touches like this that reveal the "master" mind!

(Continued on page 1053.)



The Mullard "Permacore" L.F. Transformer.

P.R. VALVES

BRITISH
MADE

LIST OF P.R. SUPER GOLDEN SERIES.						
	Type	Fil. volts.	Amp.	Imp. ohms.	Amp. fac.	
4/6 EACH Post 4d.	GPR 2	2	.095	25,000	13.5	H.F. Det.
	GPR 3	2	.095	12,000	9	L.F.
	GPR 4	2	.095	40,000	32	R.C.
	GPR 9	3.5-4	.09	22,000	14.5	H.F. Det.
	GPR 10	3.5-4	.09	10,000	9	L.F.
POWER 7/6 EACH Post 4d.	GPR 11	3.5-4	.09	44,000	41	R.C.
	GPR 17	5-6	.14	20,000	17.5	H.F. Det.
	GPR 18	5-6	.14	11,000	9.5	L.F.
SUPER POWER 12/6 EACH Post 4d.	GPR 19	5-6	.14	75,000	41	R.C.
	GPR 20	2	.15	6,000	7	Power
	GPR 40	4	.15	6,000	7	"
SCREENED GRID 15/- Each Post 4d.	GPR 60	6	.15	6,000	7	"
	GPR 120	2	.3	3,000	4.5	Super Power
	GPR 140	4	.2	3,500	4.5	"
	SG 25	2	.2	220,000	150	S.G.

2 Valves or more sent POST FREE. Matched Valves 1/- extra per set.

Sent C.O.D. if desired. Ask your dealer for them. Accept no other.

P.R. PRODUCTS, 32, P.R. HOUSE, NEWGATE STREET, LONDON, E.C.4

(Opposite G.P.O. Tube Station)

Telephone: CITY 3788

ABSOLUTELY ASTOUNDING

The new Golden Series of P.R. Valves give the most astounding results. The amplification is simply enormous and the selectivity abnormal. This is due entirely to the new filament coating, which is applied with scientific exactitude. It does not matter how much you pay for a valve you will not get better than a P.R. Golden Series at 4/6. Send for one NOW. You are protected by a "straight" Guarantee that fully covers any possible failure.

PERFECT RESULTS OR MONEY BACK

All postal breakages replaced free. Each valve has attached to it a written guarantee covering 7 months. In the event of the valve losing emission or becoming inefficient in any way during this term, a new valve will be supplied under the terms of the guarantee. If not fully satisfied that the valves received are equal to any they should be returned within a week, full refund will be made by return of post.

35/- for 19/6

POST 9d.

For a limited time to introduce our P.R. Speaker we have arranged to supply the complete KIT to make up this wonderfully powerful speaker for 19/6.

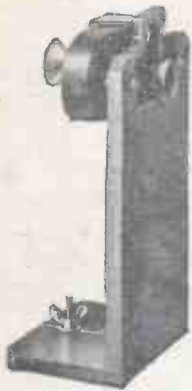
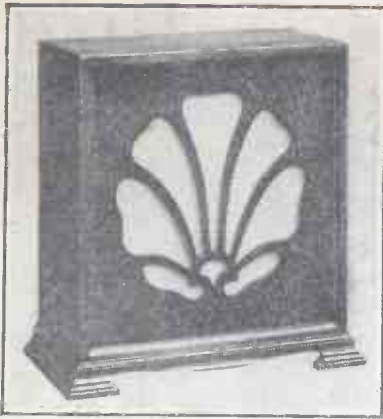
The KIT consists of our Balanced armature P.R. Speaker Unit, the Special P.R. Fabric Cone, 3-ply oak-front Baffle, 4 heavy, natural oak, cabinet-finished sides, cut ready for assembly, 4 pieces oak front moulding, 4 rubber feet, 3-ply unit cradle, screws, etc.

The whole sent safely packed by return of post ready for you to assemble with full instructions.

Please note that the above consists only of complete kit READY TO ASSEMBLE and IS UNPOLISHED.



For
better
results
use



"Melodee" Loud Speaker Cabinet and Unit Holder

No. 1. Size 15½" × 13" × 7½"

Oak, 22/- Mahogany, 24/-

No. 2. Size 15½" × 15" × 10"

Specially suitable for BROWN'S VEE UNIT, Large BLUE SPOT, ORMOND, ULTRA, etc.

Oak, 30/- Mahogany, 33/-

This cabinet has been constructed on technical lines. Special care has been taken to avoid resonance. The front of the cabinet is of sufficient thickness to carry a chassis.

The Camco Unit Holder as recommended saves cost of chassis, and is drilled to take Unit. Complete with fixing bolt and nut. No. 1 Size, 1/- No. 2 Size, 1/3.

Call and see full range of Camco Cabinets at NEW London Showrooms.

CARRINGTON MANUFACTURING Co., Ltd.,
New Showrooms: 24, Hatton Garden, London, E.C.1

Telephone: Holborn 8202. 3212

The

Dixonemeter

indicates the Pinnacle of Utility
for electrical measurements.



50 Ranges on One Meter.

The Rolls-Royce of Radio Testers. Highest Grade at a low price.

METER ONLY, 50/- RADIO SET, £4 10s.

Half the price of old-fashioned designs! Order one for 1930.

SAVES RADIO USERS POUNDS.

ELECTRADIX RADIOS,

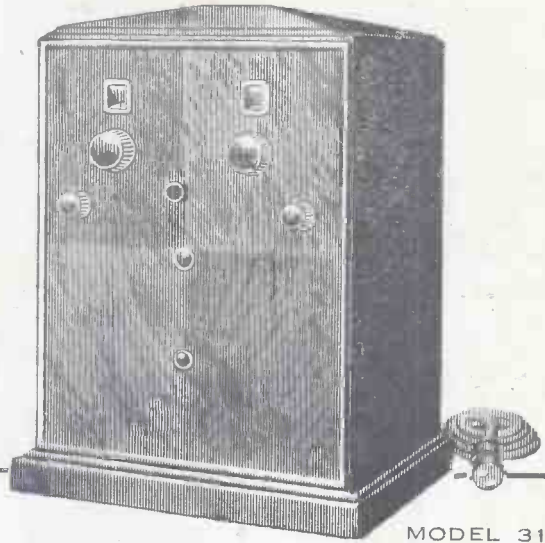
218, Upper Thames Street, London, E.C.4.

Blackfriars Station, Underground Railway

Phone: City 0191.

**FERRANTI
RADIO**

The three essentials of radio reception—
Purity of tone; Volume, and Selectivity
—are well and truly balanced. ★



MODEL 31

THE FERRANTI "All-Electric" Radio Receiver is designed by experts in the art, and built on sound engineering principles.

★ Whilst we make no extravagant claims we can definitely declare that our Set has been scientifically measured and compared with many others, and found equal to any and better than most in all the three essentials.

The price, including valves, is £25 in Oak Cabinet, and £26 in Walnut or Mahogany Cabinet. The Royalty is £1 extra. This set is available for Alternating Current mains only, voltages 200/250, 40 cycles or over.

A special order from your dealer will ensure prompt delivery.

Write for illustrated book, and if you are interested, we will arrange for a demonstration in your home.

FERRANTI LTD. HOLLINWOOD LANCASHIRE

TESTED AND FOUND

(Continued from page 1056.)



NOW HERE IS THE SET YOU WANT!

"My advice—certainly, get a Lotus, because it's undoubtedly the easiest set to work and the cheapest to run."

Worked from any A.C. Mains light socket—no batteries needed—the Lotus 3-valve S.G.P. All-Electric Receiver is highly selective and covers a good range of British and Foreign stations. Cash Price (including Royalties and Valves), £21.

Where electric light is not available, get the Lotus 3-valve S.G.P. Battery Receiver. Cash Price, £13.15.0.

Home Constructors should get the Lotus 3-valve S.G.P. Battery Model Kit at £7.12.6 cash.

All above Sets available on Hire Purchase Terms.

Ask your dealer for a demonstration or write for the Lotus Sets Catalogue and Hire Purchase Terms.

LOTUS
ALL ELECTRIC
RECEIVER

Gets the Best Reception

Made by the makers of the famous Lotus Components in one of the most modern radio factories in Great Britain.

GARNETT, WHITELEY & CO., LTD., Dept. P.W.6, Lotus Works, Mill Lane, Liverpool

Causton

POLAR DIFFERENTIAL CONDENSER.

Messrs. Wingrove and Rogers have produced a new and improved type of differential condenser, and there is a .00015-mfd. model of this available at 7s. which is suitable for the "Magic" sets. Its special feature is that it is fitted with an insulated spindle, there being a neat little pigtail connection between the moving vanes and their appropriate terminal.

In some circuits, and where a metal panel is used, this is a very great advantage. It is a well-designed and nicely-made little component.

TRIPLE TEST SIFAMETER.

Only, perhaps, with one of those "plug-in" mains sets can you afford to be without a meter. With any battery-operated set some form of meter is essential to check up the voltages of the L.T. and H.T. The new triple test Sifameter is an instrument which does everything in the way of electrical measuring that the ordinary listener using a battery-operated set requires.

There is a 0 to 15-volts range for measuring the filament voltage and grid-bias batteries; a 0 to 150 volts for the high-tension, and a 0 to 50 milliamps for checking anode currents.

The meter is of the neat watch-pattern type with a small flexible lead for the positive voltage contact. Two metal spikes projecting from the case provide the negative voltage contacts. There are two small terminals which are brought into service when the milliamp range is required.

The total resistance of the instrument is 5,000 ohms, but the device is not intended for use with H.T. eliminators, and its current drain enables you to get a more satisfactory reading of the condition of an H.T. battery than if the resistance were very high.

The dial is silver and the scale is black. The needle is alert and practically dead-beat and the readings, within the limitations of the scale, are accurate. Altogether it is a very handy instrument and one that I can recommend to "P.W." readers.

AN ELECTRIC SHOCK.

"Can you imagine a sensation of millions of red-hot needles piercing your nerves at once? Every muscle in the body seems to contract violently, jerking the whole of your body off the floor. One appears to jump backwards. One feels very weak and faint after such a sensation for some time to come."

I was very interested in these observations which I came across in one of those interesting little books, "Ralph Stranger's Wireless Library for the Man-in-the-Street," which are published at 1s. each by Newnes. These particular phrases describe the author's reaction to an accidental contact with 210 volts D.C. As he quite rightly observes, a good deal depends upon the state of one's health and the condition of one's skin, etc., and the effect varies with different people.

Whether my hands are wet or dry, I, personally, can almost enjoy anything up to 150 volts, while 200 is not much more than a pleasant tingle. I cannot hold on to the terminals of a 250 supply with any

(Continued on page 1060.)

BUILD YOUR KIT INTO

(Registered design)

THIS MAGNIFICENT VOX KIT CONSOLE

Holds both Speaker and Set!

Combines this advantage with unusually attractive appearance. Handsome overlays are supplied to suit almost any receiver. With or without speaker. Attractive art brown silk fitted in either case. When ordering, specify type of set you propose fitting into cabinet. The speaker is the famous ULTRA Double Linen Diaphragm Air Chrome type K Chassis, giving superb results at all frequencies.

PRICES:

With Speaker.	Without Speaker.
Oak - - £6 17 6	Oak - - £4 4 0
Mahogany 7 7 0	Mahogany 4 13 6

Obtainable from all good dealers. Write for full details to:-

THE BRITISH RADIO GRAMOPHONE CO., LTD.,
77, City Road, LONDON, E.C.1.

KAY'S CABINETS

This Cabinet soundly constructed of Oak and equipped with Baseboard Runners. Full Front. Minged Top. Polished rich Jacobean. 36" 45" high. For panels up to 18" wide. Also made to accommodate any Popular Set. Greatest Range of Wireless Cabinets. Illustrated Lists Free.

H. KAY, Cabinet Manufacturer, Mount Pleasant Road, London, N.17
'Phone: WALTHAMSTOW 1626.

PARAMOUNT TRIPLE CONE

WITH TUNABLE CONES

18 X 18 X 6	Chassis and Unit	2 5 0
	Complete in Oak Cabinet	3 10 0
22 X 22 X 6	Chassis and Unit	3 0 0
	Complete in Oak Cabinet	4 10 0
	Complete Cabinet	5 10 0
	Complete Cabinet	10 10 0

Chassis Model takes any Unit. All Chassis Silk Covered.

From Your Dealer Or

PARAMOUNT REPRODUCERS
153 Devonshire St. Sheffield.

WET H.T. BATTERIES

Solve all H.T. Troubles.

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

Bargain list free.

AMPLIFIERS, 30/- 3-VALVE SET, 25.

P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON.



Harmony of tone and colour

The only standard by which the efficiency of a loud speaker may be judged is your ear. The only standard by which its beauty may be judged is your eye. Hear and see the new B.T.H. Cone at your dealers.

Price £3:0:0

B.T.H. CONE LOUDSPEAKER

THE EDISON SWAN ELECTRIC COMPANY, LTD.

Ediswan Radio Showrooms:

1a, NEWMAN STREET, OXFORD STREET, W.1.

(Phone: Museum 9801.)

SHOWROOMS IN ALL THE PRINCIPAL TOWNS. W.51.

LOEWE RADIO HIGH VACUUM RESISTANCES & CONDENSERS mean BETTER SETS and BIGGER SALES!

Full particulars
from

The LOEWE
Radio Co., Ltd.,
4, Fountayne
Rd., Totten-
ham, N.15.
Phone:
Tottenham
3911/2.



No manufacturer can afford to overlook the efficiency of LOEWE RADIO Resistances and Condensers. Those tried and tested components make set efficiency an unequalled success and will better sets better sales must follow. Amateur constructors should compare these LOEWE RADIO Resistances and Condensers of all values with those that they may be using in the meantime. LOEWE RADIO points: RESISTANCES never vary. RESISTANCES effectively "fade" and eliminate "false fading" and "crackling". They are moisture and dust-proof and carry up to 10 watt without appreciable heating or change of resistance value. LOEWE RADIO CONDENSERS have their condenser elements enclosed in a high vacuum. Losses through defective internal insulation are thus eliminated. Also supplied with wire ends for soldering.

Fit the DUBILIER BATTERY*

Fitted with the long-life Dubilier Battery, your Set will give better quality performance over 66 volts. a longer period. **7/9** And it costs less!

Other Voltages Available.



Ask your dealer for a copy of the Dubilier Booklet — "A Bit about a Battery."

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

*—it is Cheaper
than others—
has longer life,
and is
British Made.

RAYMOND'S

27 & 28a, LISLE ST., LONDON, W.C.2
Come to LEICESTER SQUARE TUBE
This address is at the back of Daly's Theatre
Phones: Gerrard 4637 and 2821

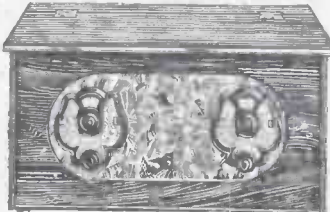
HOURS OF BUSINESS
EVERY DAY 9 to 8
SATURDAY 9 to 9
SUN. MORN. 11 to 1

MAGIC H.F. UNIT "P.W." DEC. 21
-0005 Variable, S.M. Dial, L.T. Switch, 2 Sockets, -001 Fixed, 1 V/Holder, P.W. Screen, B.B. Coil Socket, Raymond Special Choke (as used in set, 6/-), B.B. 30/- Neutralising, Two 1 mfd. 600-ohm Resistance, Strip, Terminals Wire, Clip, Screws, Panel, etc Post 1/3

KITS OF PARTS of your own selection
Quoted for at a special cash price where possible OVER **25/-** on receipt of detailed list. In value

AMAZING VALUE IN 3-VALVE LOUDSPEAKER RECEIVERS

RECEIVES LOCAL BROOKMAN'S PARK, NEW ALTERNATIVE, 5 G.B. AND MANY CONTINENTAL STATIONS.



DE LUXE MODEL ASSEMBLED IN CABINET READY TO FIX TO AERIAL
A WONDERFUL SET ALL PARTS ENCLOSED FOR DISTANCE, TRANSFORMER COUPLED SPEECH AND MUSIC. NETT. CASH NO COILS TO CHANGE

RECEIVER (as shown) with 3 D.E. Valves, (one Power), Dual Range Coil 200/2000, Battery Leads, and 9 volt Grid Bias. **69/6** BATTERIES and NOT C.O.D. SPEAKER Carriage 5/- EXTRA

EASY TERMS 12 MONTHLY PAYMENTS OF 7/9

OR **COMPLETE RECEIVER** THE LOT (AS ABOVE) WITH 100-volt H.T., 2 v. 40 L.T., Ampion Cone Speaker Aerial Equipment. Carriage 7/6. **£5-12-6**

EASY TERMS (the lot) 12 MONTHLY PAYMENTS OF 13/11
EASY PAYMENT FORM FREE IF FLAT OR HOUSEHOLDER.

SOVEREIGN WE STOCK

COMPRESSION TYPE CONDENSERS
"F" -0001 2/-
"G" -001
"J" -0003
Post 3d.
ALWAYS STOCKED SO WHY WORRY?
J.B. Condensers, R.I. Chokes, Transformers and all usual products, Lewcos Coils, Chokes, etc., Ekco Mains Units, Ampion Speakers, Brown Speakers, and all components, phones, etc., Ferranti L.F. Transformers, Chokes, Anode Resistances, Chokes, Mullard, Osram, Ediswan, Marconi Valves, Varioy Chokes and Transformers, Ormond Condensers, Dials, etc.

"MAGIC" 3 (P.W.) Our Parts Approved Editor.

KIT OF PARTS—18 x 7 Panel, -0005 Variable S.M. Dial, Reaction (Differential), L.T. Switch, 3 Sprung V.H., 2 Coil Sockets, 400-ohm B.M. Potentiometer, Neutrodyne B.B., Lewcos H.F. Choke (or R.I. Dual), Hypermu and Igranite "J" L.F., -0003 Fixed, 2 mfd., 2-meg. Leak and Holder, 25,000-ohm Wire wound, 18 x 2 Strip, 10 Terminals, Wire, Screws, Baseboard Carriage and Packing, 2/- (U.K.) Nett Cash **79/6**
KIT OF PARTS (above) including **CABINET & SET OF COILS** **95/-** By Pass. Train, 5/-
VALVES Ultra Short 3 Mullard **33/6** Wave Coils Dario 2, 4, 6, 9 Trioiron **18/6** 6/6 Set, Tungsram Set Post 6d.

VARIOUS P.W. RECEIVERS ON SHOW IN WINDOW
EASY TERMS ON KITS OF PARTS ETC. OVER **£3**

SPECIAL PRICES ON MANY OF OUR OWN LINES IF YOU SHOW THIS ADVT. AVAILABLE AT RAYMOND'S ONLY

TESTED AND FOUND.

(Continued from page 1058.)

real pleasure, but I should not consider it harmful to myself. In dealing with ordinary mains units I am afraid I do not take the precautions I advise others to take, and often accept evidence that a certain point is alive by receiving an electrical stimulus! Perhaps I have hardened to it; perhaps I have a high resistance!

Anyway, I should certainly be interested to hear from readers as to how they react to high voltages.

Of course, this is the sort of thing that one should guard against most carefully, for

Traders and manufacturers are invited to submit radio sets, components, and accessories to the "P.W." Technical Department for test. All tests are carried out with strict impartiality under the personal supervision of the Technical Editor, and readers are asked to note that this weekly feature is intended as a reliable and unbiased guide as to what to buy and what to avoid.

fatal consequences have followed the misapplication of what would seem to be incredibly low voltages. The amateur who carelessly exposes himself to even a 75-volt tingle is taking a chance.

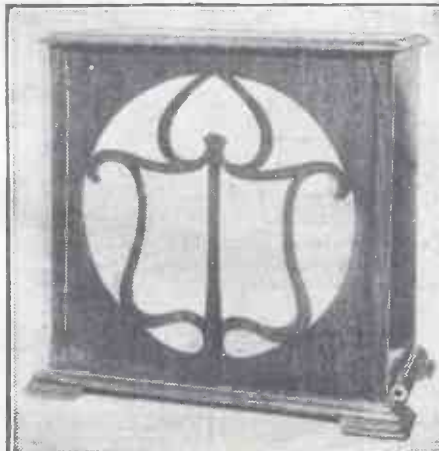
A FINE LOUD SPEAKER.

My report on the Wates Star Loud-Speaker Unit appeared comparatively recently, but I can remind you that it is a product of the Shaftesbury Radio Company, and that the Duplex model sells at 36s. It is designed on sound lines, and you will no doubt remember that I was favourably impressed by its performance.

After the unit, came the Wates double-cone chassis. This embodies two diaphragms of special construction and of different sizes which face opposite directions. The double cone operates exceedingly well with the Star unit.

Finally, we have the complete Wates Star speaker, which is a handsome cabinet model into which the Wates Star unit and double-cone chassis are built. It is supplied in oak at £4, or in mahogany at £4 6s. 0d.

Any "P.W." reader who is thinking of acquiring a really decent loud speaker should make a point of hearing this one before finally deciding.



The Wates Star Loud Speaker.

"RED DIAMOND"

THE RECOGNISED DETECTOR FOR ALL CIRCUITS USING CRYSTAL RECTIFICATION.

RD 40
By insured Post 2/3 or 2/9 with shield.
Can be mounted on brackets or through panel. Once set always ready. Not affected by vibration. Each one is tested on broadcast before despatch, and is perfect.

"RED DIAMOND" 2-WAY COIL HOLDER

RD 32 4/- EACH
Parallel working. Fine adjustment. Worm-driven. Coils cannot fall. Easy movement. Perfect finish. By insured Post 4/6.

"RED DIAMOND" SINGLE COIL HOLDER

RD 28 1/-
By insured Post 1/3. Perfect fitting. Large terminals for easy wiring. Ebonite bushes for all purposes in stock. List on application.

TRADE MARK **RED DIAMOND** REGISTR
Of all high class Radio Dealers, or Sole Makers: **JEWEL PEN Co., Ltd.** (Radio Dept. 46), 21-22, Great Sutton St., LONDON, E.C.1.

DON'T BUY ANOTHER RAZOR BLADE!

Money & postage returned if **MINI STOPPER** will not sharpen perfectly one Gillette blade 500 times 1/6 post free—**RAZORS (P)**, 125, Heathfield Rd. Birmingham.

EASY TERMS

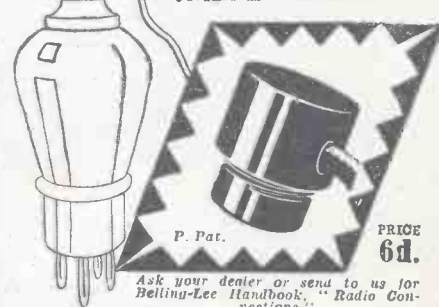
We SPECIALISE in the supply of all Good Quality Radio Sets, Components and accessories on Easy Terms. We will give you efficient service. Send us your list of requirements and a quotation will be sent by return. **LONDON RADIO SUPPLY COMPANY** 11, Oat Lane, Noble St., London, E.C.2 NATIONAL 1977.

REPAIRS

Any make of L.F. Transformer, Loudspeaker or Headphones repaired and despatched within **48 HOURS—TWELVE MONTHS' GUARANTEE** with each repair. 4/- post free. Terms to Trade.

TRANSFORMER REPAIR CO., "Repairs" Dept., 214, High Street, Colliers Wood, London, S.W.19.

EVERY SCREENED-GRID VALVE WANTS IT



Ask your dealer or send to us for Belling-Lee Handbook, "Radio Connections".

Just unscrew ordinary metal terminal and plug on the Belling-Lee Safety Anode Connector. A neat spring makes quick, efficient contact, and the whole socket is completely insulated. Even if it flicks round and touches metal screens, wiring, etc., it can't "blow" the valves.

BELLING-LEE FOR EVERY RADIO CONNECTION

Advertisement of Belling & Lee, Ltd., Queensway Wks., Ponders End, Mdx.

FOR THE LISTENER.

(Continued from page 1038.)

These two men could put up a fine scrap over a really meaty morsel. Why waste them ?

"A Guid Nicht."

Scotsmen have always been hero-worshippers, and they have an extraordinary knack of making the heathen bow down to their gods! Radio Week rendered homage to Sir Walter Scott, and on January 25th the B.B.C. is at the disposal of another "nicht wi' Bobbie Burns"! Personally, though I have the highest admiration for Sir Walter Scott as a man, and still higher admiration for one or two things that Burns wrote, I should like to see this ancestor-worship, which is vanity, confined to the coteries of the cult. We shall hear the same old jokes, the same old tags. Slightly overdone, Mr. McWhirter, I think!

Dick and the Marchioness.

I like the little Tchehov Plays. They broadcasted well; especially "The Proposal," which I thought well cast, well produced, and very well acted. I liked them also because they were short! Listening to a play is a more exacting business than seeing one. It is concentration all the time, not of the ear only, but of the imagination.

There's no relief, no by-play to watch, no ensemble except what you create in your mind's eye. I shall be interested to see what Miss Levy makes of Thomas Hardy's "Tony Kytes" on January 24th. It's a fine tale. And Mr. B. W. Findon had a brain-wave when he decided to make a musical scene "featuring" Dick Swiveller and the Marchioness out of the "Old Curiosity Shop." (This, from 5 G B on the 23rd.)

The Best Gretel?

My congratulations to Miss Suddaby who made certainly the best Gretel I have ever heard. The part fitted her like a glove, suited her the whole length of the gamut of her lovely voice.

Vaudeville Notes

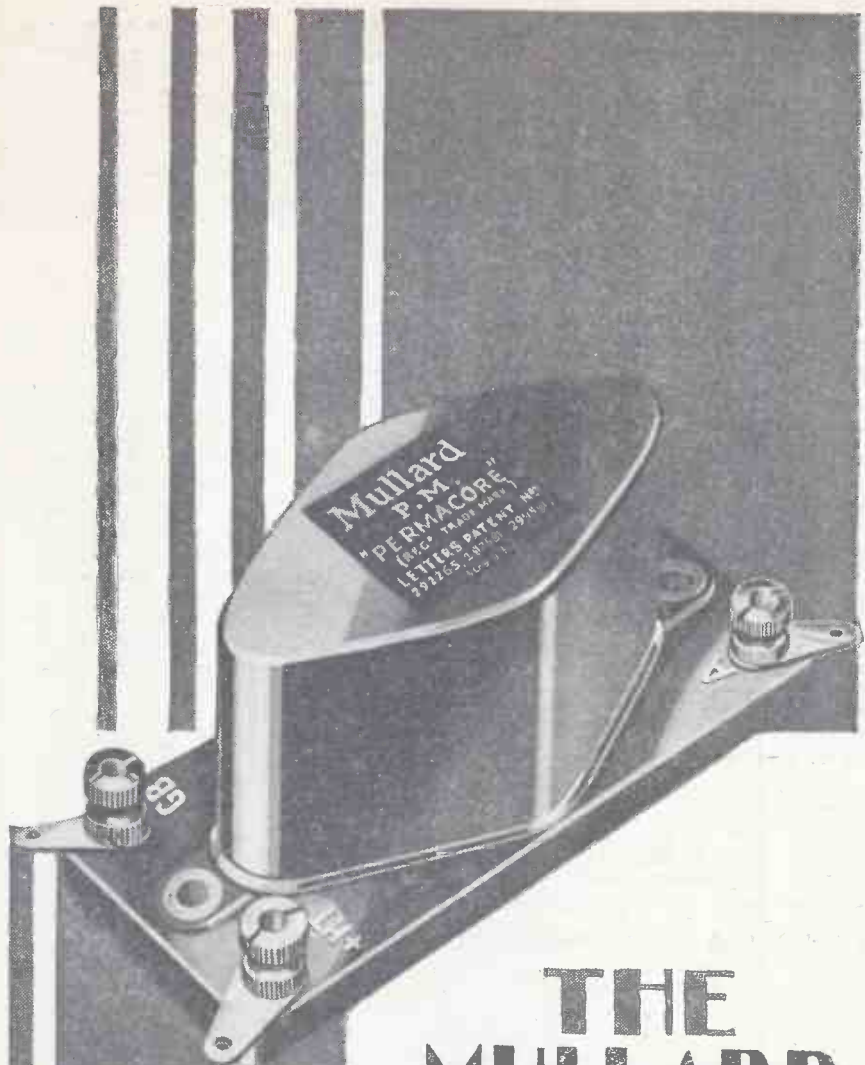
The most popular song in Radio Week: "Give yourself a pat on the back, a pat on the back!"

Which reminds me of Vaudeville, my notes on which are accumulating far too rapidly. Ernest Butcher sings his songs better than any other vaudeville artiste appearing at the "mike." Jack Rickards will go up three steps at least on the ladder when he laughs a little less often at his own jokes; though he laughs more pleasantly than some.

We all know why Ronald Gourlay is popular, but why is whistling popular? The answer cannot be a lemon! I was a little disappointed with "The Rush Hour"; the effect of the tonic was hardly up to its puff. The longer Sandy Rowan runs the stronger his stride—"Tommy look after your laurels!"

CAPTAIN ECKERSLEY
writes exclusively for
"THE BIG THREE"

'P.W.', 'M.W.', & Wireless Constructor.



**THE
MULLARD
PERMACORE
TRANSFORMER**

You can take it from us—secure in the knowledge that you get a good job for your money. It's compact. That means simplified assembly and wiring. It's efficient. It does its work properly because of its special core, the silver wire of the primary, and the nickel-wound secondary.

Hear its performance and you'll remember its name—the Mullard "PERMACORE" L.F. Transformer. It has a step-up ratio of 3 : 1.

**Mullard
MASTER · RADIO**

**PRICE
25/-**

THE LAST WORD IN SAFETY



Fit the new Belling-Lee Fuse to Belling-Lee Wander Plugs, Spade or Pin Terminals, or Plugs and Sockets, and give utmost safety to your valves and components. Fuse, with adaptor, Price 1/- Spare Fuse, 6d.

Showing the Belling-Lee Fuse fitted in a Belling-Lee Wander Plug. Price 1/4. Ask your dealer, or send to us for Belling-Lee Handbook, "Radio Connections."

BELLING-LEE
FOR EVERY RADIO CONNECTION

Advt. of Belling & Lee, Ltd., Queensway Works Ponders End.

GRAMOPHONES. Latest Horns and parts. Catalogue free. Cash or terms. Build £12 model for £3. Instructions 3d. **V. BURT, 185, High St., London, S.E.8**

EASY PAYMENTS

The first firm to supply Wireless parts on easy payments. Five years advertiser in "Popular Wireless." Thousands of satisfied customers. Send us a list of the parts you require, and the payments that will suit your convenience, and we will send you a definite quotation. Anything wireless **H. W. HOLMES, 29, FOLEY STREET** Phone: Museum 1774. Gt. Portland St., W.1

TWIN CONE KIT 2/6
PARTS POSTAGE 1/6

For a Double Linen Diaphragm Speaker
Steel chassis built, adjustable damping attachment.
Size 20" square. Takes any popular movement.
GREEN & FAULCONBRIDGE, LTD.,
11, QUEENS ROAD, COVENTRY

SATISFIED?

Are you satisfied with the results of your Set? If not, why not reconstruct or build a new Set?

EVERYTHING WIRELESS
ON
EASY TERMS

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

TECHNICAL NOTES.

Photo-electric Cells.

A NUMBER of readers who are specially interested in the application of the radio amplifier to talking pictures have asked me various questions with regard to this, and I think I can best answer them by selecting two or three representative questions and dealing with those.

In the first place, you know that in the "sound-on-film" system of talking pictures, impulses are created in a photo-electric cell by a light-beam of varying intensity; these impulses, being of the audio-frequency variety, are capable of being amplified in the usual way through an ordinary low-frequency amplifier, precisely as though they were signals delivered from a radio receiver.

One question which frequently crops up may be generalised in this way: How is the photo-electric cell used in talking movies?

Light-Recording.

The photo-electric cell is employed in talking movies to convert varying light-impulses into varying electrical impulses, these being subsequently amplified by low-frequency valve-amplifiers and reproduced by loud speakers in the theatre.

The varying light-impulses which affect the photo-electric cells are created by projecting a light-beam of constant intensity through the optical sound-record on the talking film; the photographic or optical sound-record on the film will allow various amounts of light to pass through the film, the amounts depending on how much black area is in the path of the light-beam at any particular instant.

This varying light-beam is then allowed to fall upon a photo-electric cell. As the photo-electric cell is highly sensitive to light, varying its electrical resistance according to the amount of light entering the cell, a varying electric current will be set up in the circuit in which the photo-electric cell is connected, these electrical variations synchronising with the light variations falling upon the cell. Of course there will be a certain amount of lag, but the lag is so small that we may regard the two effects as being synchronised. I should add that the photo-electric cell is polarised by means of a suitable electrical potential applied to it.

Amplifying Signals.

The photographing of sound-waves produced by the speech of actors, music of an orchestra, and so on, as well as the various "effect" noises accompanying picture action, is accomplished by a very sensitive electro-optical system.

The sound which is to be recorded is picked up by delicate microphones, similar to those used for broadcasting purposes, and the fluctuating current from the microphones is amplified by low-frequency amplifiers in the usual way. The current from the microphones, after being enormously amplified, is then passed into the sound-recorder.

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

In the recorder, the current is sent through a system which vibrates mechanically according to the variations in current strength. These vibrations are communicated to a tiny mirror from which a small but intensely bright beam of light is reflected.

As the mirror vibrates it, of course, causes the beam to vibrate correspondingly. This vibrating light beam is then passed through a hair-like slit and is focussed upon the edge of the film which is passing behind the slit.

In this way the beam of light is made to "paint" its way, as it were, backwards and forwards on the film. When the film is photographically developed it has impressed upon it a picture of the sound-waves which entered the microphones.

When a beam of light is subsequently passed through this photographic sound track this beam is itself caused to vary, as the film moves, in the same way as the original beam was varying and, if it is allowed to fall upon the photo-electric cell, the original electrical variations coming from the microphones are reproduced; when these are passed into a loud speaker and converted into sound the sound-waves which originally fell upon the microphones are reproduced and we are back with the same state of affairs as in the studio.

Coil Development.

I had some interesting notes the other day from a friend in the United States about the development of different types of coil. Apparently the first honeycomb and duo-lateral coils were designed by M. W. Stern, now the President of the Cres Radio, Jamaica.

Long before broadcasting, Stern was doing research work for the U.S. Navy Department and was making coils for the Government along with De Forest and Coto Coils. Bank-wound coils seemed at that time to be the best thing for all-wave work, but it was too much work making these coils, and so Stern hit on the idea of the honeycomb.

He found these were better than the bank-wound coils owing to smaller distributed capacity. His first coils were sent up to the Bureau of Standards for test, and immediately after this the demand for these coils rapidly increased.

An interesting sidelight on this matter is the fact that whilst the various parties who had developed these coils were busily engaged in fighting patent law cases, some other manufacturers altogether were making the coils in enormous quantities and getting all the business. By the time the patent situation had been straightened out the craze for the coils had died down.

First Transmitter.

Incidentally, this M. W. Stern was the first amateur transmitter in America, and probably in the world, his call-sign being the much-coveted 2 A B.

It appears, from letters which are in the possession of station 2 A B, that De Forest's broadcasts started in about 1907 and went on at intervals until his regular programmes from San Francisco beginning in March, 1920. In order of priority it would seem that broadcasting went from New York to San

(Continued on next page.)



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TECHNICAL NOTES.

(Continued from previous page.)

Francisco, then to Pittsburg, coming back to New York for the opening of the first commercial type of studio when W J Z went on the air in November, 1920.

Cathode-Ray Television.

Mention was made recently in this journal of the new television system devised by Dr. Vladimir Zworykin, research engineer of the Westinghouse Electric and Manufacturing Company, New York. This system was demonstrated about a month ago to a meeting of the Institute of Radio Engineers, and I am now able to give some further particulars of it.

A cathode-ray tube is used as a receiver, and this gives the new type of television many advantages over the well-known scanning-disc method.

The inventor is said to be in a position now to discuss the practical possibility of flashing the images on a motion-picture screen so that large audiences may receive television broadcasts of important events immediately after a film is printed.

It is intended to synchronise these visual broadcasts with sound, making a kind of talking pictures corresponding to talking pictures.

The cathode-ray television receiver has no moving parts which, so far as it goes, should make it more easy for the home user.

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Looking at this advantage in another way, it is equivalent to a greater number of scanning lines, and results in the picture being produced in greater detail without increasing the width of the radio channel.

I understand that this apparatus is being used in experimental form in the Westinghouse Laboratories in East Pittsburg, but that a number of similar receivers are being constructed in order to give the whole system a thorough test through station KDKA. This station, as you know, is already operating a daily television broadcast schedule on the scanning-disc principle.

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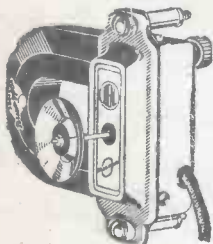
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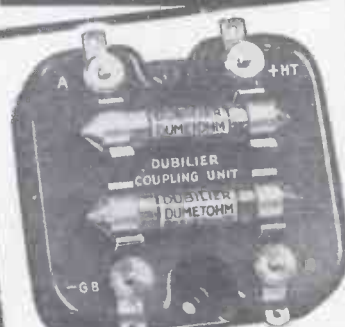
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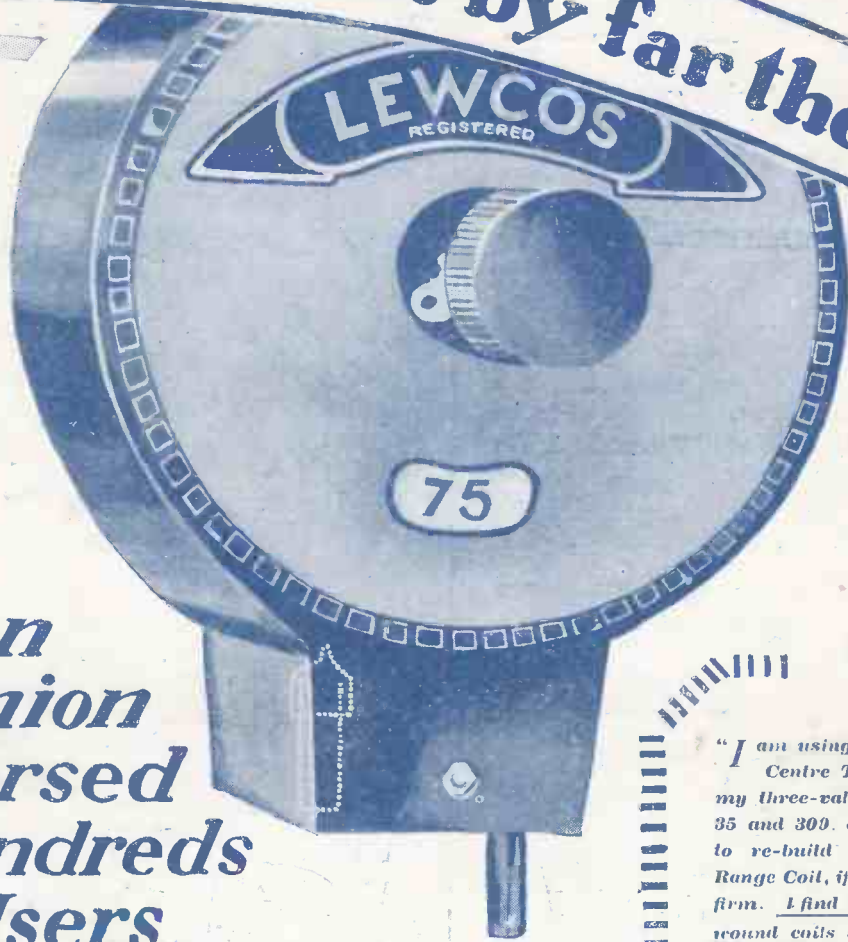
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