

A GREAT PRESENT TO READERS

Popular Wireless

Every
PR
3c

No. 295. Vol. XII.

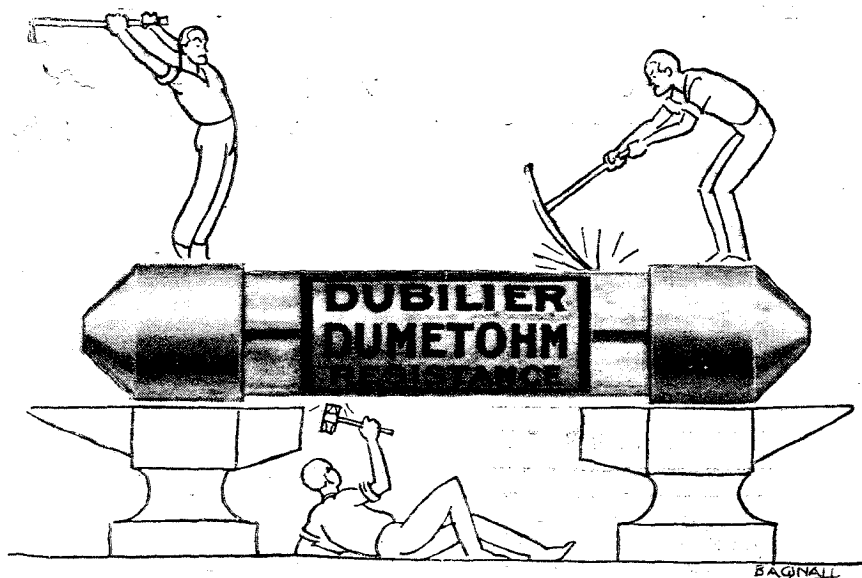
INCORPORATING "WIRELESS"

January 28th, 1928.

FOUR 6¢
BLUE PRINTS

Free!

ANOTHER 2/- GIFT NEXT WEEK



What would Happen?

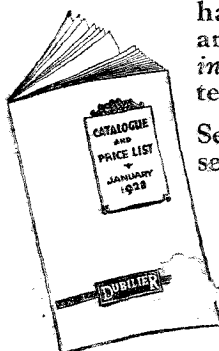
THIS is not an invitation for you to have a Dumetohm broken up to find out what would happen "if the air gets in" or to see what's inside.

In the first place the air is there already—it was never taken out. And if you do break the glass you won't find any form of carbon resistance inside—that type went out when arks were popular.

All you will see is a straight golden rod which has been metallised by a very special process to give just that smooth, unvarying resistance so essential to clear Radio reproduction. Neither temperature nor voltage affects it appreciably, it has no self inductance, no self capacity and is "easily the most popular resistance in the country" as your dealer will tell you.

See that the Dumetohm figures in every set you build.

All Dubilier Products are fully described in the catalogue shown here. In addition there is a lot of information which you may find interesting. If your dealer has run out of copies we will forward you one free.



Dubilier Dumetohm Resistances.
25, 5, 1.5, 2, 3, 4, 5 and 10 megohms.
Price 2/6 each.
Dumetohm Holders.
Price 1/- each.



DUBILIER DICTA

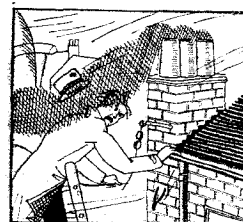


No. 6.

Have you Electric Light? If so why put up with an outside aerial which implies ladders, masts and much precarious scrambling on the roof?



The Ducon is simplicity itself to use. Plugged into a lamp holder and connected to the receiving set it forms a highly efficient and selective aerial, consumes no current, is perfectly safe, eliminates risks from lightning and reduces noise and atmospheric interference.



"much precarious scrambling."



To meet all the variety of wiring systems and reception conditions with which we are blessed in this country it is only natural that provision should be made for connecting the Ducon in many different ways. Try them through according to the full instructions supplied with each Ducon.



For instance, your Ducon may give best results when the switch controlling its lamp holder is turned off. It may be found that reception is improved by connecting the Ducon to the Earth terminal as an auxiliary to the existing earth (it is tested at 2,500 volts!).



In short, there are numerous ways in which the Ducon will prove an invaluable thing to have by you if only as a "stand-by" in case your aerial carries away. Send us a P.O. for 5/3 to-day (or order C.O.D.), mentioning this paper. We guarantee you satisfaction—or your money back—and you will find it the best investment in wireless you have ever made.



Incidentally, if you only have one lighting point in the wireless room, your electrician can supply you with a two-way holder enabling you to use both Ducon and Light.

YOU GET MORE FROM MARCONIPHONE

H.T. Supply Units that save you money

Simply plug a Marconiphone H.T. Unit into an ordinary lamp-holder and you obtain continuous and steady H.T. Supply requiring no attention—no renewal. The initial cost is moderate and upkeep costs next to nothing.

Marconiphone Model A.C.2 for Alternating Current Mains

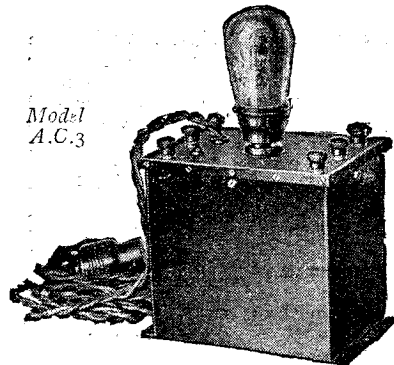
Supplies H.T. to receivers of almost any type. Output exceptionally high—40 milliamperes at 120 volts. Two models available for 100-125 and 200-250 volts. Price, including U.S. valve and royalty, £7 12s. 6d. Also two similar models for 25 cycles.



Marconiphone Model D.C.2 for Direct Current Mains

With output more than sufficient for any standard receiver—50 milliamperes at 120 volts. Tappings at 42 and 84 volts. Suitable for use on 100 to 250 volt mains. Price £4 2 6.

Model
A.C.3



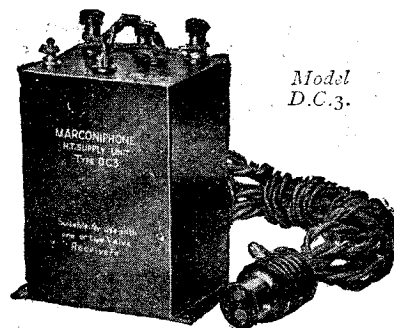
Marconiphone Model A.C.3 for Alternating Current Mains

For receivers employing not more than 2 valves and suitable for 100-125 or 200-250 volts. Complete with valve and royalty, 73/-.

Marconiphone Model D.C.3 for Direct Current Supply

Very neat and inexpensive, this model is for receivers using not more than 2 valves. All components and wiring are enclosed in sealed metal case. Price 35/-.

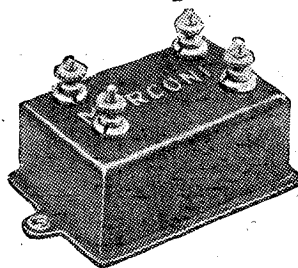
Model
D.C.3.



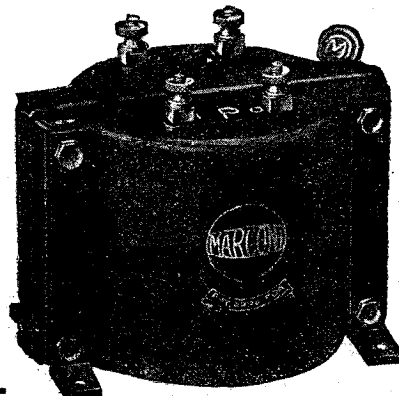
The modern method of L.F. amplification

Marconiphone Amplifying Devices build up whispers into voluminous sound, yet never do they sacrifice tone purity for the sake of volume. Incorporate them in the L.F. stages of your receiver and it's just as if the music had come much nearer. But volume is the only thing that's added—harshness and distortion have no place in a Marconiphone-built amplifier, especially if Marconi Power Valves are used.

For the first L.F. Stage use one of the new Marconiphone R.C. Units. Remarkably compact, they maintain their stated value under all



Above—R.C. Unit.
Below—Ideal Transformer.



conditions with absolute silence. There are two types. Type "A" for valves of medium impedance—8/-. Type "B" for high magnification valves—7/3.

Follow this with the famous "Marconiphone" Ideal Transformer—proved distortionless throughout the musical scale and guaranteed against mechanical and electrical defects for 12 months. In 4 ratios, 2.7 to 1, 4 to 1, 6 to 1, 8 to 1. 25/- each.

Send for full particulars of all Marconiphone Wireless Apparatus.

**THE MARCONIPHONE
COMPANY, LIMITED,**

**210-212, TOTTENHAM
COURT ROAD, W.1.**

H.T. FROM YOUR MAINS

FOR YOUR COSSOR
"MELODY MAKER"



IF you have electric light you are wasting money every time you buy H.T. batteries. Start saving money—build an H.T. Eliminator and get current from your mains. Send the coupon for a book which shows you how to do it. "How to build your own H.T. Eliminator for A.C. or D.C." is written by an authority for the makers of T.C.C. Condensers. If you follow its concise instructions, clear photographs and simple diagrams you will have no difficulty in building an Eliminator which will give you constant H.T. from your electric light mains—for negligible cost. And, if you use T.C.C. 600 volt Condensers, you will build an Eliminator that is utterly safe and reliable. Send the coupon to-day. It will cost you nothing.

BE SURE TO USE

T.C.C.

CONDENSERS

Telegraph Condenser Co., Ltd.,
Wales Farm Rd., N. Acton,
London W.3.

I enclose 1d. stamp.
me your book, "How to build
H.T. Eliminator for A.C. or D.C."

Name.....

Address.....

Please send

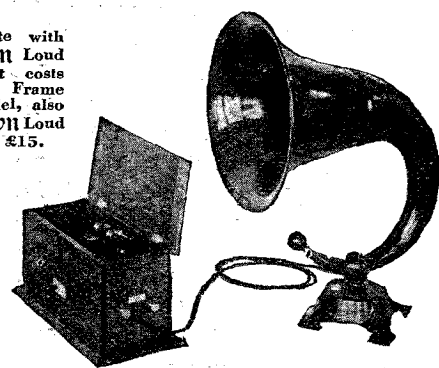
free!

P.W. Jan. 28.

Stop paying bills

THERE'S a certain Wireless Set which is puzzling people. If you were to hear its loud speaker you would be perplexed. You would look hard at the Set and would probably ask the owner what were the valves and where was the accumulator. His reply, which would astound you still more, would be that he had neither a valve or accumulator in the place. At that you would look for the twinkle in his eye but not find it. Then he would tell you that his set was the BROWN Ideal Wireless Set,* which was so wonderful that it worked a loud speaker without valves or accumulator. "Do as I've done," he would conclude, "stop paying bills for accumulator recharging. Get a Brown Ideal Set and enjoy Wireless without worry or expense." And you would, wouldn't you?

* Complete with BROWN Loud Speaker, it costs £12.10s. Frame Aerial Model, also with BROWN Loud Speaker, £15.



Brown

IDEAL WIRELESS SET

NONE SO GOOD



The Valve
with the
**NICKEL
FILAMENT**

For high emission, low filament temperature, economical operation, ability to stand high anode voltages and for all round excellence of results, there are no 2-volt valves so good as the new B.T.H. Nickel Filament Valves. Buy some to-day—they will last you for years.

B 210 H <i>R.C. and H.F.</i>	B 210 L <i>General Purpose.</i>	B 215 P <i>Power Amplifying.</i>
Fil. Volts 2	Fil. Volts 2	Fil. Volts 2
Fil. Amps. 0.10	Fil. Amps. 0.10	Fil. Amps. 0.15
Max H.T. Volts 150	Max H.T. Volts 120	Max H.T. Volts 120
10s. 6d.	10s. 6d.	12s. 6d.

The above prices are applicable in Gt. Britain and N. Ireland only

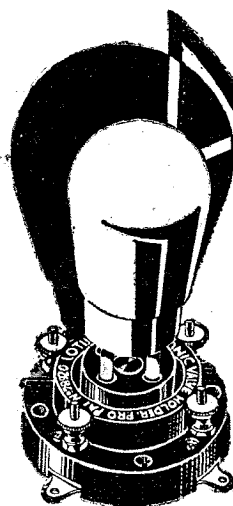


VALVES

NICKEL FILAMENT

Made at Rugby in the Mazda Lamp Works.

The British Thomson Houston Co. Ltd.



A perfect connection at once!

Put a valve in a Lotus Valve Holder.

Immediately the phosphor bronze leg sockets expand and automatically lock. There is a perfect and permanent connection. The floating platform in which the valve is fixed is suspended by four phosphor bronze springs—springs which have great mechanical strength, but are sufficiently resilient to absorb any external shocks liable to damage the valve.

Lotus valve holders are made from the finest bakelite mouldings obtainable. Every one is tested before it leaves the works.

From all radio dealers

LOTUS
BUOYANCY
VALVE HOLDER
ANTI-MICROPHONIC

REDUCED PRICES:—

Valve Holder with out terminals .. 1/6
Valve Holder with terminals .. 1/9
Lotus Valve Holders are used and recommended in the Mullard circuits in "Radio for the Million" and are ideal for use in the "Master Three" and the "Cossor" Melody Maker.

Makers of the famous Lotus Remote Control, Lotus Vernier Coil Holder, and Lotus Jacks, Switches and Plugs.

GARNETT, WHITELEY & CO., LTD., LOTUS WORKS, BROADGREEN ROAD, LIVERPOOL.

WIRELESS CONSTRUCTOR ENVELOPES

No. 1. "The Radiano Three" Now on Sale Price 1/6 net.

Here is the first of a new series of Constructor Envelopes which thousands of amateurs have been in need of for many a long day. No. 1 is now on Sale—an envelope containing full instructions for building the famous P. W. Harris receiver

"THE RADIANO THREE"

In this envelope you will find every detail of the set simply explained; photographic reproductions and diagrams are included, as well as a

FULL-SIZE BLUE PRINT

"The Radiano Three" is a set you can build in an hour or two—no soldering necessary; and a wide choice of components and valves open to you.

Stop at the bookstall or newsagents and buy the first of the Wireless Constructor Envelopes, and remember—it is a Percy W. Harris Set.

Details of future Envelopes will be announced later

THERE IS NO SHORTAGE

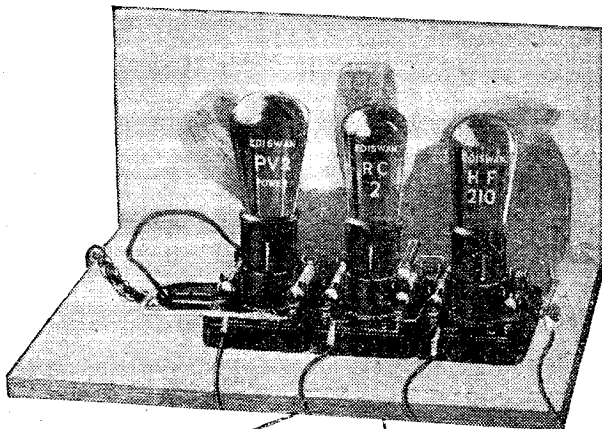
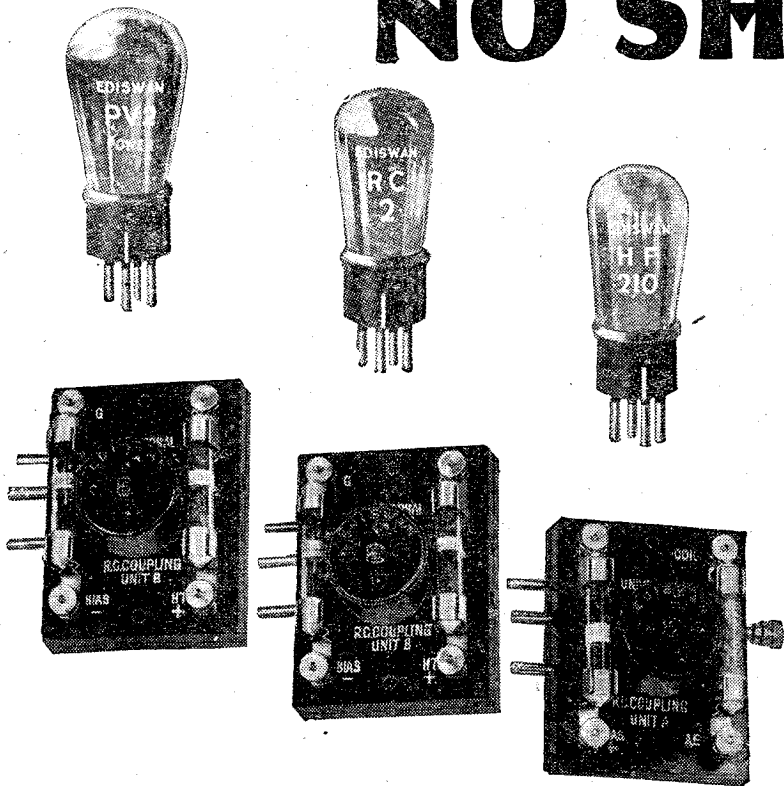
OF THE NEW R.C. THREESOME COUPLING UNITS AND VALVES

Get the parts for this wonderfully simple 3-valve set on your way home. Your wireless dealer now has ample supplies of all the necessary parts.

You can get several stations on the loudspeaker with a wonderful volume of crystal purity.

The New R.C. Threesome has only 5 wiring connections—requires no soldering, and can be made in an hour.

The remarkable results claimed for this set can only be guaranteed if you use Ediswan Valves H.F.210, R.C.2 and P.V.2.



P.W. 28.1.28
To THE EDISON SWAN ELECTRIC Co. Ltd.
(Publicity), 123/5, Queen Victoria Street,
London, E.C.4.

Please send, post free, presentation
copies of the New R.C. Threesome
Instruction Book and Blue Print.

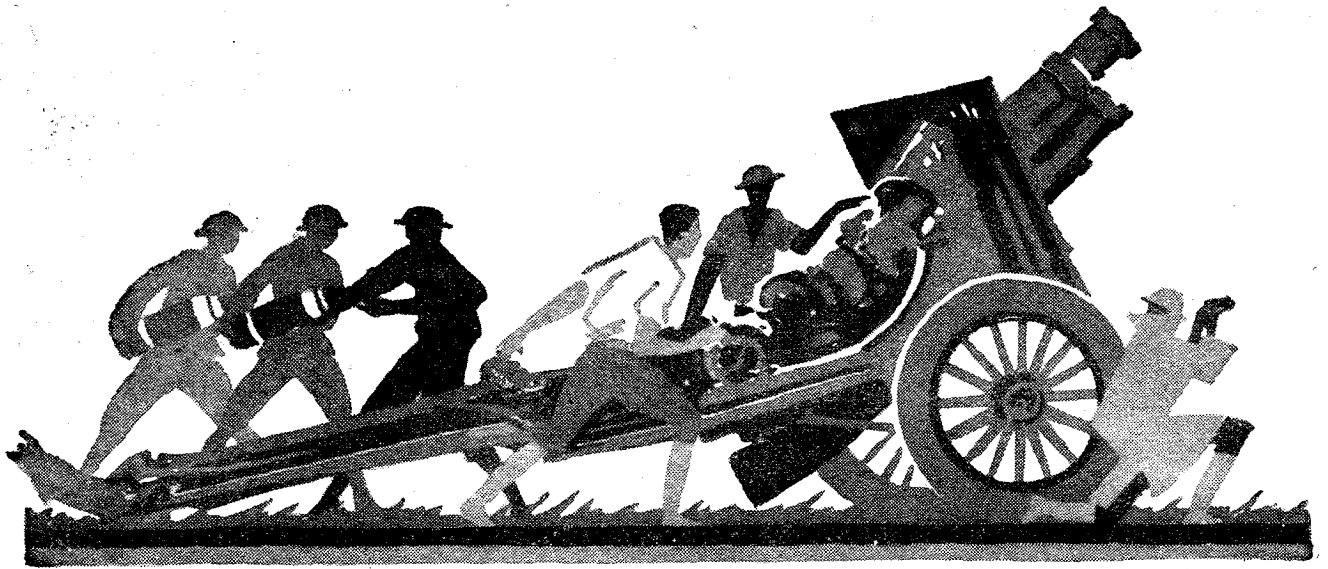
NAME.....

ADDRESS.....

EDISWAN VALVES

CLEAREST-STRONGEST LAST THE LONGEST

A type for every purpose



TEAM WORK

SWIFTLY the shells are passed forward from man to man—and fired. Six men acting like a machine. Each in perfect unison with the next—working together. Team work.

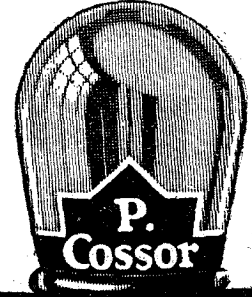
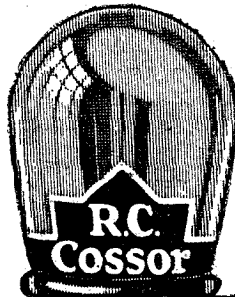
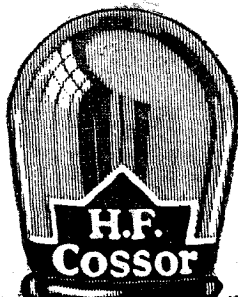
Team work is as essential to success in Radio as in warfare. Choose a team of Cossor Valves* and, for the first time, know the full capabilities of your Wireless Set. Because every Cossor Valve is designed to function correctly with its neighbour—as a team—your Set will take on a new lease of life. It will give you purer tone, far more life-like reproduction and greater volume—for less upkeep cost, too.

* Your nearest Dealer stocks Cossor Valves for every purpose, for 2, 4 and 6 volts. From 10/6.

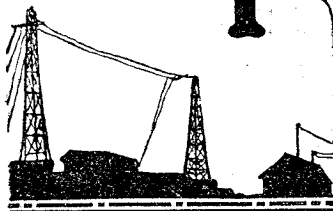
COSSOR Valves

give you
Distance

Clarity
& Volume



Popular Wireless



Scientific Adviser:
Sir OLIVER LODGE, F.R.S.

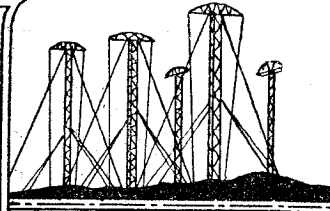
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RADIO NOTES AND NEWS.

Latest About Television—The Year's Howlers—Peeps Ahead—A New Short-Wave Set—
The Big Shout—Re-opening of PCJJ—Radio Romance.

Latest About Television.

ACCORDING to report, Mr. J. L. Baird has arranged with the Post Office for a trial of his system across the Atlantic by "beam." Interesting and laudable ambition! But we should all be glad to hear something more to the point about things which concern us, namely, an attempt at a service in this country and the appearance of a cheap television receiver.

Topical Talk.

THE Savoy Hill Corporation reminds us of an acquaintance who began this year with a couple of boils on the back of his neck, for they have got "controversial broadcasts" and "spoken English" to demonstrate that troubles crop up even in the most excellent organisation. As to the B.B.C. and the pronunciation of English—let them try to standardise it, and by the time they get their book printed they will have recognised the futility and mischievousness of the effort. As to controversy by radio, my own view is that it would be bad policy to extend it.

A Friendly Word.

A WORD of advice, in friendliness. Not a hundred miles from Savoy Hill—as the gossip-writers say—there is a place where people eat. I go there. I have seen a number of young men lunching together there. They talked "shop" with loud voices. Putting two and two together I gathered that they were employees of the B.B.C.—most of them. I thought it a pity that (1) they were not more particular about pronunciation, and (2) that they were not more discreet in their comments about well-known persons. They may know me by my ginger whiskers and green tie—and speak in whispers next time.

Music Note.

I THINK that most of us were glad to know about Edward German's knighthood. In my opinion, his music exhibits the perfect medium between high-brow and low-brow, and I have never tired of any of it. "P. W.'s" congratulations to Sir Edward.

The Year's "Howlers."

WITH the annual reports of the schools appear the customary list of "howlers," many of which have a radio flavour, due to the B.B.C.'s intrusion into the scholastic world. Here are a few: "Wireless is a voice from a box about sponges and where they grow and other weeded subjects. The masters seem to like this and quarrel about turning knobs."

"Atoms are what Sir Lodge talks about on a crystal set and are smaller than mollycoddles."

"Etther is everywhere except between programs. So then London takes a little piano music till it comes back."

More "Howlers."

"INDUCTION is what they do to curates."

"Resistance is two kinds—passive, negative and leased. Leased resistance is a line leading to a thing the easiest way."

"A valve is electric light through a grid-iron on a plate."

EXIT JOHN HENRY.



John Henry was possibly the first really great British microphone humorist, and he and "Blossom," who are seen above, became known the whole world over. It seems probable, however, that J. H. will never be heard again on the ether, for he has asked to be released from his contracts to appear in pantomime. It is stated that there was no quarrel between him and the B.B.C.

"Wave-length is the length of waves and you measure it on a condenser with a killer-cycle."

Station Statistics.

AFTER fun, figures. Extraordinarily interesting statistics have been compiled by the U.S. Department of Commerce. Here are some of them: Apart from the 685 broadcasting stations in the U.S.A. there are in the world 431 stations in 57 countries. Europe has 196, N. America 128, South America 52, Asia 18, Oceania 28, and Africa 9. Cuba is said to have 47 and Italy three! Twenty countries have only one apiece, and France and Mexico have 18 each. The most powerful stations outside the U.S.A. are Motala and Moscow, each 40 kw.

The Mysterious Thirty-Four.

THE ownership of 34 stations has not been reported. I hope this number includes the station which specialises in Bolshevik propaganda. Governments own and operate 77 stations; associations and institutions, 87; commercial establishments, 69; broadcasting companies, 127; private citizens, 33. (Is Marcuse in this total?) Six church organisations run stations; publishers, 15; ministries of war, 4; ministries of education, 2—note the preponderance of war!

Peeps Ahead.

MORE good news! Next week, "P.W." will present its readers with four more sixpenny blue-prints free. The date of the issue is February 4th. Chalk it up! On February 1st another "Modern Wireless" will see the light, and it will be a stunner. Amongst other notable tit-bits there will be "The Music Master" set, described by W. James; a free (1/-) blue-print of this remarkable three-valver will be handed to each buyer of the magazine.

A New Short-Wave Set.

THEN you will find more about our friend the 1928 "Solodyne," and there are full details of a "Universal" short-wave receiver, given by the writer of our popular short-wave notes. By the way,

(Continued on next page.)

NOTES AND NEWS.

(Continued from previous page.)

the technical gang let out that this set can also be used for ordinary broadcast reception by means of plug-in coils.

Muddling Kids' Minds.

THE education cranks of the B.B.C. still have a strong "pull." Apparently they imagine that our school-teachers need help, and that our children can spare some time from arithmetic and spelling. Fallacies, both. I have before me the B.B.C.'s programme of broadcasts to schools for January 16th to June 22nd. It includes a lot of red ink, an advertisement for a second-hand bookseller, and some impudent instructions to school-teachers. Amongst the subjects on which your children's precious time will be frittered away I note, "Catkins," "How Snipe Drum," "Gliders," "Crete and Sea Power," "Mildew," "Ringworm," "Rot" and "Mould." The B.B.C. has lost control of itself!

A Handy Book.

PITMAN'S—the firm that makes our lady clerks what they are, bless 'em!—I mean the lady clerks—come forward with a very handy little radio year-book. Eighteenpence for 118 pages, including articles by Dr. J. A. Fleming, Captain Eekersley, the Editor of "P. W." ("Amateur Radio in 1927") and Mr. J. F. Corrigan, a well-known contributor to "P. W." There are a number of very interesting photographs which are guaranteed to interest "the fambly." Knights of the Cats'-Whisker especially will enjoy Mr. Corrigan's contribution.

Insurance Against "Morse."

SURELY one of the most extraordinary insurance contracts ever made is that which was recently signed by Lloyds and Dodge Brothers, of New York. Dodge's were to give a broadcast of "The Victory Radio Hour," on January 4th, and insured their programme against interruption by S.O.S. calls from ships at sea. In America the stations close down when a distress call is "on the air." The premium was £600 and the consideration was the payment by Lloyds of £200 for every minute the programme was held up by distress calls.

The Big Shout.

IN the U.S.A. they "hook-up" their stations for S.B. when they want to give a specially zippy bit of advertising, and on January 4th for the famous Dodge programme, there was the biggest "hook-up" ever, on behalf of a motor-car, when more than 30 million listeners were roped in. The broadcast was S.B. to places as far apart as New York, Chicago, Hollywood, and New Orleans; it lasted one hour and cost £200 a minute. For a modest nation these Americans seem to be overfond of advertising.

Amateurs Invade "Movies."

I THINK that for a collection of live wires the Wimbledon Radio Society bears off the palm, for its members have acted and "shot" a cinematograph film, entitled "Tracked by Radio." Shades of poor Le Queux! The film was taken at Leith Hill

in September, during one of the society's field days. We are, of course, a slow lot in England, but I do hope that this bit of enterprise will be noted in the States. Have the "fans" there done the like, I wonder?

Egypt Forges Ahead.

ON January 15th, the Egyptian Marconi Company took over the British Post Office's station at Abu Zabal, near Cairo, and opened a wireless service which links Egypt up with the world-wide Marconi system. The transmitter is of the "arc" type, but that is to be replaced as soon as

SHORT WAVES.

One of the B.B.C. pronunciation experts has listed twelve ways of saying "Yes." Not counting Edgbaston's "Quaite" and Washwood Heath's "That's raite."—"Birmingham Gazette and Express."

Colour-Scheme, Northcote. No, you will not get Ireland on your crystal set, even if you do cover all the connecting wires in green rubber sleeving.

THIS WEEK'S OSCILLATOR.

A correspondent expresses surprise that the radio trade has not been stabilised when it has coils and condensers which it uses for this purpose every day.—"Southend Times."

Teacher: "What would make a good ground connection for a radio on a farm?"

Pupil: "Well, I think—"

Teacher: "Correct. You may take your seat."

"Imagination is a wonderful asset. Is there a radio enthusiast who can get on without it?"

Wave-lengths will be longer soon with the new marceles.—"Radio Digest."

Householder (savagely, to persevering canvasser of wireless accessories): "I have already told you that I do not buy from canvassers. Do you want me to amplify what I have said?"

Persevering Canvasser: "Yes, sir; but before you begin, let me bring to your notice the merits of the world-famous 'Zogo' amplifier, which . . ."—"London Opinion."

"Who's the stranger, mother dear? Look! He knows us! He is queer!"

"Hush, my own! Don't talk so wild. That's your father, dearest child."

"He's my father? No such thing! Father died, you know, last spring."

"Father didn't die, you dub! Father joined a radio club; But they closed the club, so he Had no place to go, you see. No place left for him to roam; That's why he is coming home. Kiss him; he won't bite you, child. All these radio men look wild!"

—"American Paper."

possible by the most modern equipment. How things change! Beam aerials over the ancient barrows of Wessex and over the hidden tombs of the Pharaohs.

Sweden—Ditto.

THE Swedish Board of Telegraphs announces that broadcasting in that country is not to stand still during 1928. Far from it. The power of Malmö and Göteborg is to be increased from 1 to 10 kw., and a medium-power station is to be erected in the south of Sweden. Subject for broadcast to schools: "How Swedes Swell."

Sound.

DO my readers remember my notes on sound, when I said that sound is not a thing, but a sensation? I added that to a deaf man sound is non-existent. My Oslo pal, A. N., who is still hankering after

telepathy, instead of examining the evidence for or against it, sends me a postcard. He says: "To a stone-deaf man sound is sound and nothing but it." Bless me! What a debater A. N. would make! To a man without mathematics or a detector, radio waves are non-existent. For a man who cannot see, colour does not exist. Does that make it plain to A. N.?

Short-Wave Stations.

NOT necessarily telephony. Los Angeles, K Q T, 44-77; Taganrog, R A V (?); Habarovsk, R A B L, 22; Tommat, R L T, 23; Sebastopol, R C T, 64; Vladivostok, R A O Z (?); Petrozavodsk, R D I, 34-2; Nivegorod, R P P (?); "Radio News," New York, W R N Y, 30-91; Iowa, 6 X U, 61-06; Coteysville, 2 X A L, 30-91; Cleveland, 8 X F, 63-02; Columbus, 8 X J, 54-02; Harrison, 8 X A L, 52-05; Coney Island, 2 X B H, 54-02.

Rival Paradises.

ON January 7th, I reported that Death Valley, California, was claimed as the D X fiends' paradise. Queer coincidence! Ten minutes after writing that I turned up a letter from W. H. B. (Jo'burg), in which he refers to South Africa as "the DX-hound's paradise." W. H. B. is cheerful about radio prospects there, and says that 5 SW is the tonic though not the cure. He got the Dempsey-Tunney fight from 2 X A F, 2 F C, 5 S W, P C J J and A N E (Java). Is a staunch reader of "P. W." and lives in Mayfair. Asks if he is a Valve Bart. No, sir! An I.D.B. (Imperial DX Baron).

Amateur Transmitting Note.

C. H. B., owner of radio station G 2 A X, asks me to say that the correct address of that station is 10, Montecotte Road, London, N.8. He could not choose a better means of publicity than "P. W.," and I hasten to comply with his wish.

Reopening of P C J J.

THIS well-known station, which has been undergoing rebuilding, is once more transmitting regularly every Tuesday and Thursday, from 6 p.m. to 9 p.m. G.M.T., on 30-2 metres. Amateurs over most of the world will be glad to hear this bit of news.

"Mayday."

GLADLY do I avail myself of this new distress call—which means "Help me!" For a report reaches me, by pigeon post—the "little bird" who whispers—to the effect that an Irish orator, speaking of the development of radio since the days of Hertz, said, "All along the sands of time we see the footprints of an unseen hand."

Radio Romance.

THE romance of radio is largely cancelled out by its own destruction of romance. A lady who—presumably in search of the new, strange, and romantic—took a journey through Central Asia, says that the Kazaks, a wild Tartar people, kindly gave her full details of our last coal strike, quoting the names and politics of our political leaders, all of which they had learned by radio. It's a sickening world for an explorer!

ARIEL.



COIL-CHANGING every time one wishes to go over from the local to 5 X X certainly is a bit of a nuisance, and listeners who do not mind confessing human laziness are very naturally demanding some way out of the difficulty. Of course, it can always be done fairly easily in a simple set by providing duplicate tuning circuits and a change-over switch, but if this is done in the ordinary fashion, it means a certain amount of complication and also a good deal of expense.

In the "Long-Short" crystal receiver the desired end has been achieved in a very simple fashion, with relatively little complication, and the extra cost is probably not more than about five shillings. The desired simplicity has been achieved by using a rather neat little scheme of plugs and sockets, while the cheapness of the duplicate tuning circuit for the long-wave station results from the fact that the tuning condensers are of the very low-priced compression type, costing about half-a-crown, or 3s. 6d., those actually in the set being "Formodensers." Other makes are, of course, available, such as the Igranic "Pre-set."

Simple Operation.

The simplicity of the change-over scheme will at once be apparent if you will take a glance at the circuit or pictorial diagram on the blue print. You will see that there are five sockets and two flex leads carrying plugs on their ends, and by inserting these plugs in the appropriate sockets you will see that (a) the aerial is connected to either the short-wave or the long-wave tuning circuit, and (b) the crystal and 'phones can be connected across whichever of these circuits is in use.

For example, if the plug on the end of the flex lead from the crystal detector is inserted in the socket nearest to it on the pictorial diagram, and the aerial plug is placed in the socket immediately above the one just mentioned (see pictorial diagram again), the set is arranged for the reception of a short-wave station (the local station, or 5 G B, that is), while to receive 5 X X they are changed over to the other

Here is a crystal set, simple and inexpensive to construct, which has "de luxe" operating qualities. Having set the two easy adjustments, either one of the two stations "registered" can be switched on in a second.

Designed, Built and Described by the "P.W." Research and Construction Department.

pair of sockets, as you will no doubt be able to make out for yourself from the diagrams. We shall be going into this point in greater detail later, and shall then see what the fifth socket (the one immediately below the terminal A_2 on the circuit and pictorial diagrams) is intended to do.

The change-over scheme, as you will now see, is really very simple, and there is no reason why it should cause any loss of efficiency (some switching schemes *do* cause such a loss) As a matter of fact, the "Long-Short" receiver is quite a good one, judged on efficiency alone, without

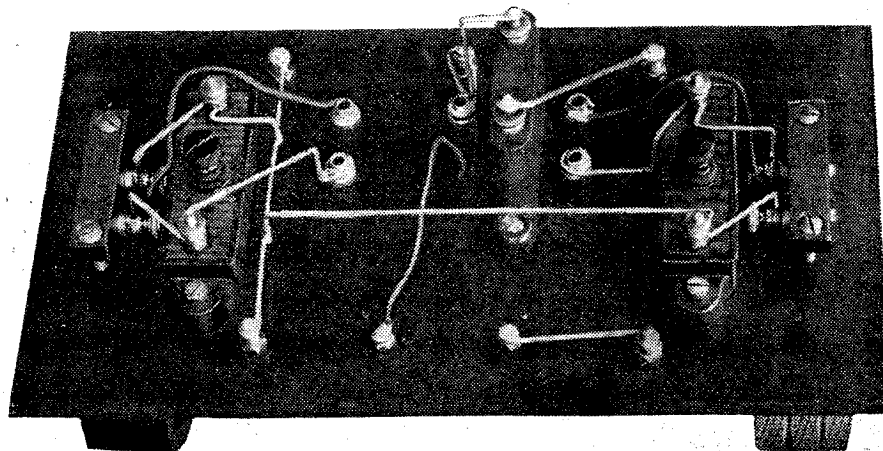
taking its convenience into account, and is well up to standard as regards strength of signals. Its selectivity, moreover, is distinctly good, and can be made better still, if circumstances demand, by connecting the aerial to terminal A_1 instead of to A_2 (the normal one), which brings a fixed condenser of .0005 mfd. in series in the aerial circuit.

Panel and Case.

Turning to matters constructional, the first point to claim our attention is the question of panel and box (it can hardly be called a cabinet!). The panel is $8\frac{1}{2}$ in. by $4\frac{1}{2}$ in., this being a size which has already been used for one or two units of various sorts in "P.W." Any size close to these dimensions can, of course, be used if it happens to be at hand. The thickness can be either $\frac{3}{8}$ in. or $\frac{1}{2}$ in., and for safety's sake it is wise to choose one of the well-known "branded" materials, such as Becol, Ebonart, Pilot, Radion, Resiston, Trelleborg ebonite, etc., etc.

This panel forms the flat top of the box, which latter need only be about 2 in. deep inside. The one we actually used

(Continued on next page.)



The simple design of this efficient little receiver will be apparent upon examining the above photo. Note the two "variable-fixed" condensers, with which the two stations are tuned-in all ready to provide alternative programmes at a second's notice.

THE "LONG-SHORT" CRYSTAL SET.

(Continued from previous page.)

is a good deal deeper, but this was merely because it happened to be at hand from a previous job.

The original was actually obtained from Messrs. Peto-Scott, and no doubt any of the usual cabinet makers will be able to supply it (Artercraft, Bond, Camco, Caxton, Maker-import, Peto-Scott, Pickett, Raymond, etc.).

Looking at the set from the front, i.e. with the crystal detector nearest you, at the back are three terminals (the earth and the two aerial terminals A_1 and A_2), while to the right is the low-wave coil socket, and to the left is the socket for the long-wave coil. These sockets can be of the proper panel-mounting type, or you can use the ordinary baseboard kind and mount them on the top of the panel.

Assembling the Set.

Near the middle of the panel the sockets and plugs are mounted, while at the front will be found the crystal detector and the two 'phone terminals. Underneath the panel there are only three components, namely, the fixed condenser of .0005 mfd., and the two variable ones. The fixed condenser actually in the set is a T.C.C., but, of course, any of the other good makes can be used (Clarke, Dubilier, Goltone, Lissen, Marconiphone, Mullard, etc.).

The variable condensers, if of the Formodenser type, can be either the panel mounting or the baseboard variety. They were of the latter kind in the original "Long-Short," and it was intended that they should be adjusted once and for all to the two stations

desired (the local on one and 5 X X on the other) before the set was placed in its box, all that was required subsequently being to move the plugs for one station or the other.

If, of course, you expect to tune between your local and 5 G B on one of them, it will be as well to obtain the panel-mounting type. With these the knob projects through the panel and so you can make adjustments without taking the set out of its box. By the way, the capacity indicated for these on the diagrams is that of one of the Formodenser range, and if you choose a different make you will require to select one as near to these capacities as you can get.

Very Simple Wiring.

The wiring-up of the set is a very simple business, and can be done with any of the usual materials, such as Glazite, Junit, bare tinned wire, etc., but you should note carefully the various flex leads which pass through holes in the panel to the plugs, centre-tap terminals on the coils, etc.

THE 6d. BLUEPRINT OF THE "LONG-SHORT" CRYSTAL SET IS ONE OF A SERIES PRESENTED FREE WITH THIS ISSUE OF "P.W."

When the set is finished you will need to obtain two coils before you can try it out, and these will both be of the centre-tapped variety (Lewcos, Lissen, etc.), one being a No. 60 and the other a No. 200. Of these the No. 60 is for the local (low-wave) station, and the No. 200 for 5 X X. Insert these in the appropriate sockets, and place the plugs as follows for the low-wave station: The plug from the crystal detector goes in the socket nearest the front of the set of the right-hand pair (I assume that you will have the crystal detector nearest you, and so call this the front of the set).

First Tests.

The plug carrying the connection from the aerial (i.e. from the underside of the terminal A_2 or thereabouts) goes in the rear socket of the right-hand pair. Now set the cat's-whisker lightly touching the crystal, and tune in the local station to the best strength, and having done that readjust the detector to give the loudest signals.

Next transfer the plugs to the left-hand pair of sockets and tune the other variable condenser (the one nearest the high-wave coil) to give the loudest signals on 5 X X. (You will probably find the long-wave station not so loud as your local, but that is only natural.)

This completes the

adjustment, and you can now place the set in its box and secure it with a couple of screws in the comfortable assurance that all you will need to do in the future will be to change over the plugs to hear one station or the other, and perhaps re-set the crystal at intervals to be sure of a sensitive adjustment.

Extra Selectivity.

Now for the use of the fifth socket: This is the socket near the A_2 terminal, and it is intended that the plug on the end of the flex lead from the crystal detector shall be inserted here when a little more selectivity is needed on either the short waves or the long. In some cases this will also lead to a slight increase in volume, so it is always worth trying.

If a still further increase in selectivity is needed (for example, when trying to cut out

POINT-TO-POINT CONNECTIONS.

Earth terminal to one 'phone terminal, to one terminal on each of the semi-variable condensers, and to one side of each coil holder.

A_1 aerial terminal to one side of the .0005 fixed condenser.

Other side of fixed condenser to the A_2 aerial terminal, to the socket facing same, and to a plug via a flexible lead.

Remaining 'phone terminal to the crystal side of the crystal detector.

Cat's-whisker side of detector to a second plug via a flexible lead.

Sockets nearest the aerial and earth terminals to the centre taps on the two plug-in coils via flexible leads.

Remaining sides of the coil holders to the remaining terminals on the semi-variable condensers nearest them and to the remaining sockets also adjacent.

This completes the wiring.

a powerful local signal in favour of 5 G B), connect the aerial lead to A_1 , instead of to A_2 . This usually leads to a slight reduction in volume, and always involves a little re-tuning on the condensers for the best results. It is particularly useful when your aerial is large or "heavy," as it is called. Finally, a word of warning: It is scarcely worth while making a "Long-Short" if your local station is 2 L O, because at present, at any rate, 2 L O and 5 X X practically always have the same programme, except as regards dance music. This set is mainly intended for the provinces, where the local station and 5 X X have different programmes. In the London area a set to give a choice between 2 L O and 5 G B is all that is needed, unless you are particularly keen on the extra dance music given by 5 X X.

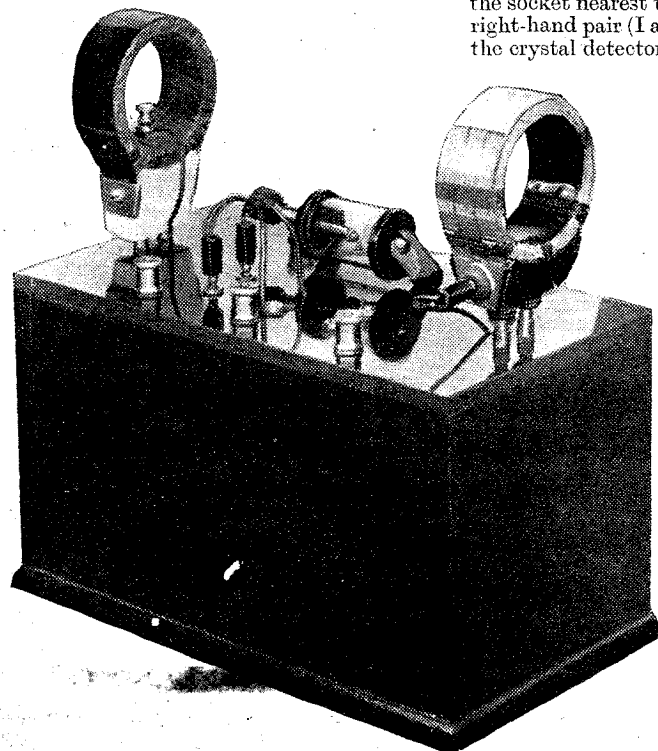
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The easily handled plugs with which the change-over can be made are to be seen in this photo. Also, it will be noticed that the two plug-in coils are of the centre-tapped variety. The three terminals to the left are, top to bottom, Earth, A_2 , and A_1 . When the aerial lead is taken to A_1 the .0005-mfd fixed condenser is brought into series, and the selectivity of the little receiver considerably increased. When the lead is taken to A_2 this condenser is out of circuit.



OVERHAULING A HORN-TYPE LOUDSPEAKER

Some really practical notes which will help
you to improve your reception.

By H. D. ALDRIDGE.



MANY readers are in possession of, and derive much pleasure from, a horn-type loud speaker. Quite a lot of these instruments can give very loud and clear signals, and fairly faithful reproduction of the programmes transmitted; but the majority fall far short of doing justice to the excellent quality of the B.B.C. stations. After hearing a good cone-type loud speaker, the drawbacks of an average horn model are often painfully obvious. Wherever it is possible, readers who possess a horn model should couple a good cone speaker to the output of their set. If that does not give satisfactory results, they may be sure that nothing will put things right until the set has been made to alter the quality of its output.

Adequate grid bias, ample H.T., and a low-impedance power valve on the last stage are essential for undistorted output. Correct filament voltage and judicious use of the much-abused reaction coil are equally important.

Stopping That Rattle.

Assuming that one is satisfied with the output from the set, and the needle of the milliammeter does not exhibit symptoms of D.T.'s, the main objective now is the loud speaker itself. The hints that follow on improving the tone of one of these instruments have been very successful in several bad cases of L.S. distortion.

Readers will understand that it is useless coupling a poor little midget-size "Baby Squirming" to a "Rake-em-in Five." The size of the L.S. should be on the "weight for age" principle. The first step is to connect up as usual and switch on, listening for obvious faults for a few moments, such as blasting on the lower scale and fade-outs on the high ranges.

Rattling is often brought about by a loose diaphragm or badly-fitting connection between horn and base. Switch off, disconnect the speaker, and remove the horn from the base. Carefully examine the base, and find out the method by which the cap is connected to the base (some types screw on like a 'phone earcap, others are fastened down by screws). Having removed the cap carefully, the surface of the diaphragm will be exposed. Many surprising objects have been found in this aperture, especially where there are

children; buttons, pieces of orange-peel, and paper pellets being quite common; and dead flies and small moths are not unknown, to say nothing of a good layer of dust.

Having dealt with these, remove the diaphragm by sliding it across the face of the magnets, not by a direct upward pull. The whole magnet and adjusting system is now exposed. Obviously, the first thing one does is to test the strength of the magnets, but not by pulling the diaphragm on and off. A piece of tin will serve for this purpose.

If the magnets do not exercise a good, strong pull, they should be sent, or taken, to a firm who specialise in re-magnetising.



A diaphragm which has become bent or distorted in shape should be carefully straightened, or replaced.

Next the bobbins themselves should be tested very carefully. If they do not fit tight, and slide up and down the laminations, they should be fastened by a few drops of gum being run down inside their centres. Replace the magnets in the base and re-fix the adjusting system, finally re-joining or re-soldering the two leads from the bobbins to their respective poles. These two wires, and also the wire at the rear of the bobbins which joins the two windings together, should be examined for insulation, care being taken that they do not touch the magnets or metal casing, or a "short to frame" will occur and curious troubles result, with the risk of slight shocks.

Adjusting the Magnets.

The face of the magnets should receive careful attention. One may be on a different level from the other, or one end higher than the other. This can be ascertained by placing a steel rule on edge, or a straight knife-back, across the top of the base, adjusting the magnets until a small light gap shows between them and the edge of the rule. They should be equidistant

at both ends, the rule being slid across the flat top of the base, and any variation being compensated by adjusting the spring or springs in the base. If these faces are not level, power will be wasted, as one magnet will stick to the diaphragm before the other can exert its full force.

If they are badly out of alignment, it is advisable to have the faces re-ground; but, with a little patience, a satisfactory medium can be obtained. Attention is now directed to a very important factor—the diaphragm itself. Examine this carefully, as this is the vital part of the instrument. A pronounced dimple will often be seen in the centre, where the clumsy operator has allowed the magnets to press hard against its surface.

Completing the Overhaul.

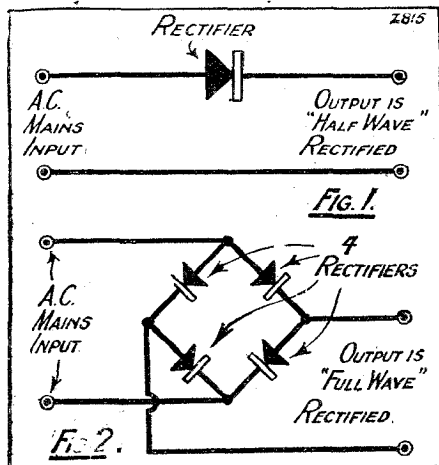
A diaphragm like this, or a bent one, should be discarded. A new one can be purchased for a few coppers, the old one being taken as a pattern. One metal that will serve this purpose satisfactorily is "Stalloy," so see that the new one is marked thus. Then we come to the washers or damping rings. If the old ones are worn or creased, scrap them. New ones can be made by laying the diaphragm on a sheet of thick blotting-paper and marking out a ring a fraction larger than the disc itself. Cut round this and fold the resulting circle exactly in half, then cut out the centre a quarter of an inch from the edge, and an unbroken ring will result.

Four of these should be cut out, two under and two on top of the diaphragm edge. Before replacing the diaphragm, obtain a few pieces of cotton-wool, tease them out, and pack lightly into the spaces around the magnets and bobbins to fill in the air spaces. This prevents a lot of hollowness in tone. Place the first two washers on the edge of the base, and put the diaphragm back in place. Put two more on top, replace cap, and screw up, making sure the washers are perfectly flat and that the magnets are drawn well down from the diaphragm. That concludes the treatment for the base.

Finally, choose the best position for the speaker; the worst is on top of or facing the set. Any reader who cares to carry out the advice given will be sure that he is getting the best from the material on hand.

ONE of these days, as has frequently been predicted, radio receivers are going to be standardised in such a manner that they will be as easy to place in operation as vacuum cleaners or any other household electrical devices. This we have always regarded as an inevitable development. Where there are electric supply mains, why should one have to bother about batteries to work a wireless set? It seems foolish to have to collect electrical energy from outside sources when it is available in one's own home.

With power mains laid on, one has at one's disposal enough energy to operate a score of sets, and the development of dry



rectifiers is just one further step towards the ideal of absolutely domesticated radio. Although there are valves whose filaments can derive their heat from the activities of "raw" A.C., there does not seem at present any likelihood of our being able to supply the anode circuit with anything else other than smooth and "rippleless" direct current.

Rectifying A.C. Current.

Therefore, where A.C. mains are concerned it is necessary first to rectify and then smooth for this purpose. The smoothing is very simple. This merely entails chokes and condensers—components that can permanently be built into a set like low-frequency transformers, or coils, and which do not entail irritating maintenance. But rectification hitherto depended upon such things as electrolytic cells which are like miniature accumulators, or high-emission valves. Now, however, we have what is known as the dry rectifier as an alternative, and one which has many attractions. Let us divert a moment to review the problem of rectification.

The Meaning of "Cycles."

Our A.C. mains deliver a current of electricity which changes its direction many times per second. This current flows first in one way and then in the other. At first the current rises from zero in one direction to a maximum point, then falls again to zero and repeats the operation in the other direction. The one complete rise and fall in each direction constitutes a cycle, so that mains labelled "50 cycles" do this 50 times per second. A rectifier is a device which will enable current to flow through it in one direction only, or, at least, very many times much better in the one direction.

If we connect a rectifying device in one lead of a pair connected to our A.C. mains,

A NEW RECTIFIER.

The description of an interesting device, which, among other things, enables fixed condensers to be eliminated from mains units.

By
A SPECIAL CORRESPONDENT.

as shown in Fig. 1, the current will be what is known as half-wave rectified. Detached impulses will flow from the leads, for the simple reason that when the current reverses it cannot flow because of the action of the rectifier.

But by connecting up four rectifying devices, as shown in Fig. 2, we can obtain what is known as full-wave rectification. We now have a current which flows in one direction only, but which rises and falls. It can easily be smoothed out and made into quite "rippleless" direct current, the sort of energy delivered by ordinary H.T. batteries. A crystal detector is a very excellent rectifying device in some respects, but it will not handle enough current to supply energy to operate valve sets. But quite recently the Westinghouse Brake and Saxby Signal Co., Ltd., have introduced a metal rectifier which is nearly as permanent in its qualities as a grid leak.

A Simple Article.

This firm hold patents on the device which date back six or seven years, but they did not place their appliance into production until they had carried out a great number of experiments. The Westinghouse metal rectifier is a very simple article. Essentially it consists of a copper washer and a lead washer clamped together. One surface of the copper washer is oxidised, and the action of the device depends upon the junction between this oxidised surface and the body of the copper itself.

The whole thing is clamped together into a small and very robust little element. I recently saw this new Westinghouse device very thoroughly demonstrated, and

I must say I was impressed. Its functioning depends upon the fact that the ratio of the resistance from the copper to the oxide coating is very high compared with the resistance from the oxide coating to the copper. The ratio of these two resistances is of the order of one thousand.

The unit has the very high efficiency of an average of over 60 per cent, and this compares exceedingly well with any other rectifying device.

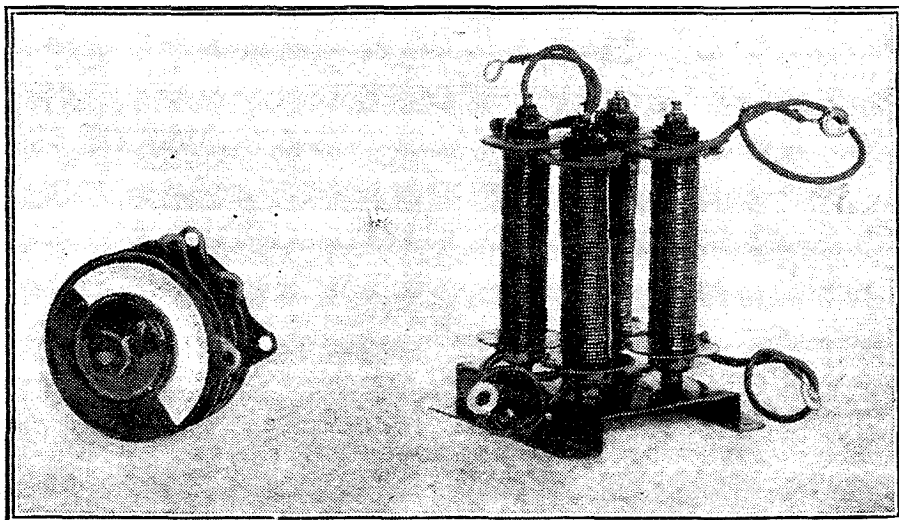
Elements in Series.

There are several sizes of these units available, but the one generally employed for radio H.T. eliminators, and so on, is capable of handling, I believe, 3 or 4 volts and about .5 amperes. But where, as in the case of H.T. eliminators, it is necessary to handle voltages running up to 150 or so, it is a simple matter to clamp a number of these units together in the manner indicated in the photograph, the assembly being quite compact.

Supposing each unit was capable of handling but 3 volts, it would be quite easy to clamp four together, in order to cope with 12 volts. If it were desired to pass more than .5 amp. any number could be placed in parallel, so that it cannot be said that the unit has any current-carrying or voltage limitations!

Several Useful Applications.

In a very interesting handbook the Westinghouse people indicate a number of novel and useful applications of their new metal rectifier. For instance, they show how it can be used for smoothing current similarly to fixed condensers. A group of the elements joined up in series is placed across the output lead from a rectifying unit. With increases in current the resistance to the flow of current of the paralleled rectifying elements in the one direction drops and thus the peaks of the ripples, as it were, tend to be by-passed. The hollows are filled up by the induction action of low-frequency chokes and thus "rippleless" current results. I heard a receiver in operation which was served by an eliminator employing such a scheme and no fixed condensers of any type, and I must say the results were very good indeed. No hum was discernible, and it appeared that the object had been achieved.



On the left is shown a small group of the rectifiers clamped together and all ready for use in a charger unit. Four larger groups of elements "piled" in series for handling H.T. in an H.T. eliminator are shown on the right.

The Microphone

A brief and interesting description of how "Mike" does his work.

By A SPECIAL CORRESPONDENT.

I SUPPOSE if you had asked people a few years ago "What is a microphone?" not one in ten thousand would have heard of such a thing. In these days of broadcast reception probably there is not one in ten thousand who has *not* heard of the microphone. But I wonder how many of those have any real idea how the microphone—or "Mike" as he is known to his intimates—goes about his work?

Transforming Voices.

Many people will perhaps be surprised to know that they themselves employ a microphone several times every day. For when you speak into an ordinary telephone, at your home or at your office, the little mouthpiece into which you speak catches the sound and directs it into a tiny microphone, about the size of a penny, which is placed just within the instrument and behind the mouthpiece.

What is the purpose of the microphone in a telephone instrument? Its purpose is

The action of the ordinary microphone—generally known as the carbon microphone—is very simple. It was discovered many years ago that if a piece of carbon be placed in contact with another piece of the same material, the electrical resistance, that is the resistance offered to the passage of an electric current across the contact, varies considerably with the mechanical pressure between the points.

If the two pieces of carbon are touching each other lightly the electrical resistance will be relatively high, whilst if they are pressed together firmly the electrical resistance will become very much smaller. If, therefore, we connect an electric battery across such a contact, the current which will flow from one carbon point to the other will vary considerably as we vary the mechanical pressure between the points.

In the telephone, what we do is to connect an electric battery through the microphone and include in the circuit certain other devices, which we need not discuss for the moment. The microphone may comprise two tiny oblong carbon discs with carbon granules in between. One of the carbon discs is attached to a small diaphragm, and it is upon this diaphragm that the sound waves of your voice fall when you are "speaking into the telephone."

Electrical Variations.

The result is that one of the tiny carbon discs vibrates in accordance with the voice and therefore exerts rapidly varying pressures upon the carbon granules, so causing corresponding variations in the resistance of the circuit.

As explained above, the electric current which will pass through the microphone will vary with the variations in the pressure, and thus variations are imposed upon the electric current corresponding to the sound-waves of the voice. This electric current then passes through various instruments and passes out eventually to the telephone wire to be carried to a point perhaps miles away.

Now in the case of wireless broadcast an arrangement is used which is precisely similar in principle to the above, although different in details. The microphone in the broadcast studio via an amplifier causes variations in the amplitude or strength of the "carrier-wave" which proceeds from the broadcast transmitter.

The carbon granule microphone, as you know from your everyday experience, is quite satisfactory for use with the ordinary

home or office telephone, but with the very great refinements in radio broadcast it was soon found that the carbon microphone did not sufficiently faithfully transform the sound-waves into electrical variations.

The "Moving Coil" Type.

Radio scientists therefore set to work to improve the microphone, and a type was eventually adopted depending upon the *magnetic* principle. This magnetic or magnetophone instrument is, in principle, the same as the telephone receiver, that is the part of the telephone which you hold to your ear. A magnet surrounded by a coil of wire is used and a movable part or "armature" is arranged in proximity to this magnet, this armature being free to vibrate in accordance with sound-waves falling upon it.

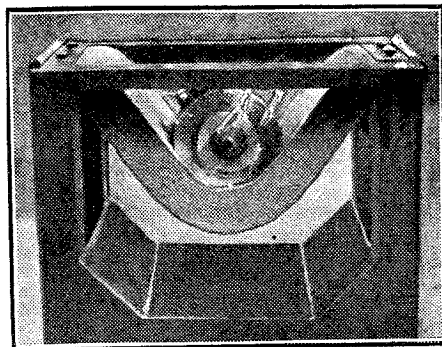
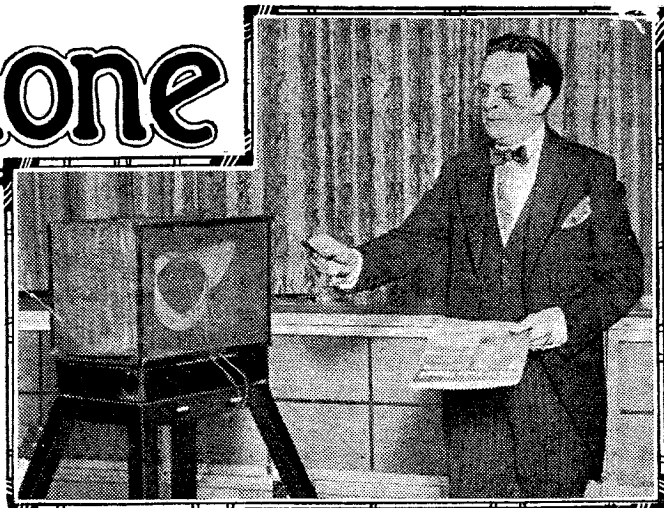
As it vibrates it sets up, by induction, varying electric currents in the coils of wire around the magnet, and we then have our desired transformation from acoustical energy to electrical energy complete. Many other improvements in design have taken place, but the modern microphone as used for broadcast work is based upon the magnetophone principle.

A PANEL-DRILLING HINT.

WHEN drilling a smooth-surface ebonite or composition panel many amateurs often experience a very great difficulty in maintaining the drill in a perfectly vertical position, and consequently the hole drilled through the panel is not straight.

A good tip to remember when engaged on work of this nature with smooth surfaced panels is to observe the reflection of the point of the drill on the ebonite surface. If the point of the drill is not entering the panel in a perfectly straight manner, the fault will be exaggerated enormously in the reflection. Always, therefore, see that the line formed by the drill point and its reflection is perfectly straight, and you will then have no difficulty in obtaining perfectly true holes in the panel.

This hint cannot be applied to dull surfaced panels, in which no reflection can be seen



A broadcasting microphone of one of the earlier "moving coil" or magnetic types.

to transform the sound of your voice into corresponding vibrations in an electric current. We can transmit an electrical current over great distances by means of a fine copper wire, but we cannot send sound-waves over great distances. Therefore, we use this simple little instrument to produce a varying electric current, and we send the electric current, now impressed with variations corresponding exactly to the sound-waves of the human voice, over the telephone line, this fluctuating electric current then passing at the other end into the "telephone receiver."

What the Carbon Does.

This diaphragm imparts motions to the air, and the electrical variations are once more transformed into sound variations, so that the sound of the speaker's voice is reproduced at the other end.

TECHNICAL NOTES

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

VARIABLE CONDENSER TROUBLES.

A PRECISION JOB—CURING THE FAULT—USING INSULATING TAPE—THE VARIOMETER.

Variable Condenser Troubles.

ALTHOUGH there are now so many first-class variable condensers on the market which are really excellent examples of engineering design and workmanship, there are still large numbers of "the other kind," and often the scraping, grating and crackling noises which are so frequent an accompaniment to tuning operations are due to defects in the variable condenser vanes. You are always advised to take great care to keep the spaces between the vanes clear of any particles of grit.

With a set which is housed in a proper cabinet, it is hardly likely that actual particles of grit will get between the condenser vanes in the ordinary way, but, of course, if you happen to have been making any alterations in the circuit or doing any work upon any parts within the cabinet, it is quite likely that grit or dirt between the vanes may result. Cleaning between the vanes may be carried out by means of a pipe-cleaner or a small feather, but it should be done very carefully and care should especially be taken not to distort the vanes in any way.

A Precision Job.

Owing to the very small clearance between the moving and fixed vanes, it is a matter requiring some engineering precision to ensure that the clearance shall remain reasonably the same during the whole range of motion of the rotor. This is where the trouble frequently comes in. Vanes may be very nicely spaced for one position of the rotor, but, as you turn it round, you come eventually to a part where one of the moving vanes touches a fixed vane even ever so lightly. You will then find that scratching and sometimes very loud crackling noises are heard every time you move the condenser dial to a position in the region of that particular setting.

Curing the Fault.

If trouble of this nature is experienced, the only remedy is to remove the variable condenser from the set, place it upon the operating table where the light can easily be seen through the spaces between the vanes and then, with great care and patience, bend the offending vane (by means of a penknife blade) until the proper clearance is obtained. But it is very easy to over-do the remedy, and unless you are very patient you will find that you have made the condenser worse instead of better. If the trouble is serious and the condenser a valuable one, it is better to send the condenser back to the makers to be properly adjusted, or for a new vane to be fitted. It is always wise to examine a condenser very carefully before buying it, in case trouble of this kind should be present.

Using Insulating Tape.

Insulating tape can be used for many purposes besides covering joints in electric-light flex. For instance, if you have a length

of busbar which has to lie in close proximity to another, and you happen to be "out of" insulating sleeving, you can very easily cover the busbar with an effective equivalent by wrapping it with insulating tape placed lengthwise, instead of being wrapped around in the usual fashion.

A piece of tape of about $\frac{1}{2}$ in. width is cut, approximately the same length as the busbar to be covered, and laid straight upon the table; if the busbar is then laid along the midline of the tape the latter can be neatly folded over so as to give the busbar an excellent sleeving.

In fact, a somewhat similar method may be used where you wish to cover a portion of a busbar which is already in position in the set. If you wanted to slip over a piece of tubular sleeving you would have to unsolder one end of the busbar, and even then you might find it very inconvenient to get the sleeving into position. But by taking a suitable length of insulating tape and manoeuvring it into position below the busbar you can make quite a fair insulating jacket.

Insulating tape should not be always left in a warm place, as it is

apt to become very dry and to lose its "stickiness."

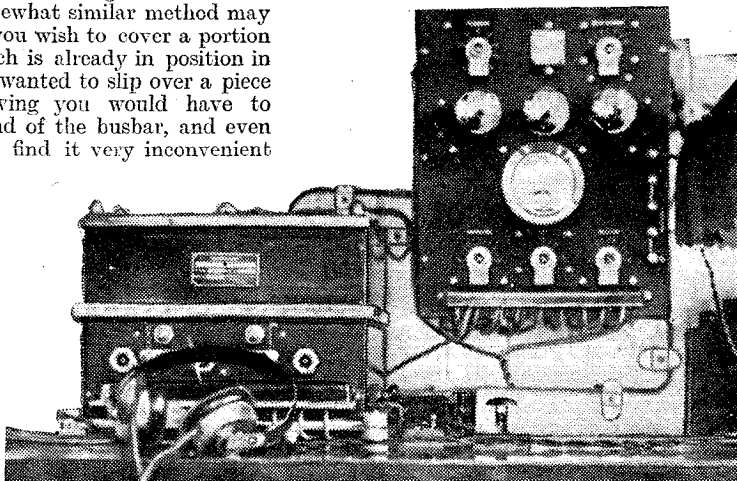
The Variometer.

I wonder how many experimenters still use the variometer? I have had a number of letters in connection with this and the subject of coils generally since my reference in these "Notes" a short time ago to the general question of coupling.

In the earlier days of crystals the variometer held its own, but latterly there has been a tendency to discard it in favour of plug-in coils, used, of course, with a variable condenser.

Frequently when an instrument falls into disuse it is recognised later to have many advantages, and often finds a return to popularity. The variometer has, of course, the advantage that it does not require the use of a variable condenser, and it generally occupies about the same space as that instrument. Since the plug-in coils are not necessary, the space which would have been

(Continued on page 1123.)



A corner of the radio room on the S.S. "Mayheer," a Cunarder on the England-West Indies route, showing the new automatic S.O.S. receiver. This device, which will be a compulsory British ship fitment after this year, picks up all distress calls within a radius of 300 miles, automatically ringing bells in three parts of the ship—viz., the radio operator's room, the radio room, and the chart room.

NEWS FROM SAVOY HILL.

FROM OUR OWN CORRESPONDENTS.

A ROYAL BROADCAST.

SWEDEN'S DAY—"SHADOWS" AGAIN—"OURSELVES AS OTHERS SEE US"—
A GERARD WILLIAMS PROGRAMME.

Duke of York to Broadcast.

THE Duke of York, the Right Hon. Winston Churchill, Chancellor of the Exchequer, Sir Warren Fisher (who is to preside), Sir Samuel Scott, and Sir Herbert Creedy are to make speeches at the annual Civil Service dinner, which takes place in the Grand Hall at the Connaught Rooms, London, on Friday, February 10th. They will be broadcast from 5 G B between 8.25 and 9.30 p.m.

Sweden's Day.

Sweden is the next country on the list of those to be honoured by the broadcasting of special programmes representative of their music, drama, and literature. The date chosen is Sunday, February 12th, when practically every European country will,

at some time or other, radiate concerts of items selected by Swedish broadcasters, that from our own stations being heard during the afternoon.

Since this important and systematised interchange of national programmes was instituted some months ago, we have had concerts dedicated to France, Germany, Austria, and Czecho-Slovakia, while these and other countries have also reciprocated by giving British programmes. According to present arrangements, these concerts will be given at intervals until the end of the present year.

The idea underlying the scheme, however, is much more important than most listeners appear to appreciate, though this may be because the present arrangements

(Continued on page 1121.)

"SUPERS" and "ULTRAS"

IN these days when new circuits and improved types of apparatus appear almost daily, it is often a matter of difficulty for the wireless amateur to distinguish between what is really something special and what is merely a conventional circuit or article described by an over-enthusiastic owner or manufacturer.

The extravagant use of the terms *super* and *ultra* is apt to be particularly misleading, for whilst many manufacturers will lay claim to producing goods of super-quality, or ultra-efficiency, there are, nevertheless, a few cases in which these expressions convey a definite technical meaning, and it is proposed here briefly to summarise the more important of these.

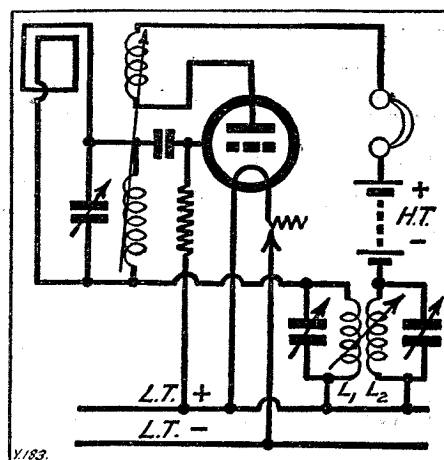


Fig. 1. An Armstrong super-regenerative circuit.

Perhaps the best known example is the famous "Armstrong Super" circuit.

Any circuit giving exceptionally good results may be called a super-circuit, but in the case of the Armstrong circuit the *super* referred originally to an excessive degree of reaction, from which it was called "super-regenerative."

The Armstrong Circuits.

Any circuit utilising super-regeneration may, with some justification, be called a super-circuit, and here the expression may be regarded as a genuine title.

The operation of the Armstrong Super is probably quite familiar to readers, who will recognise the single-valve circuit in Fig. 1. Here the valve receives and detects signals in the ordinary way, reaction on to the aerial coil being employed. In addition

A few of the circuits genuinely deserving the above description are described in an interesting and practical manner.

By C. E. FIELD, B.Sc.

to the usual reaction coupling, the plate and grid circuits are coupled by means of two large coils, L_1 and L_2 , whose values and coupling are such that the valve normally oscillates at a frequency of, say, 10,000 cycles a second, or at the upper limit of audibility.

The result of this relatively low frequency oscillation being superimposed upon that due to the ordinary reaction is that the latter is periodically interrupted before the oscillations have time to build up to a steady value. Thus, excessive, or "super" reaction may be employed and enormous amplification obtained without the valve being paralysed, as would be the case if no interrupting oscillations were applied.

The Supersonic Heterodyne circuit, also associated with the name of Armstrong, is briefly referred to as the Super-Het., and is another instance of a circuit the title of which has a definite technical meaning.

The Ultra-Audion.

Although the circuit is possibly the last word for selective reception, and as such may be said to give super results, this has no bearing on the name Super Het.

In a simple supersonic heterodyne circuit a valve is made to oscillate at a frequency differing from that of the incoming waves by, say, 50,000 cycles per second, and these oscillations are superimposed upon those in the aerial coil, the result being a beat or heterodyne note at a frequency of 50,000 cycles, corresponding to a wave-length of about 6,000 metres.

This is the supersonic (i.e. above-audible) heterodyne from which the circuit gets its name. The long-wave signals are then amplified by transformer-coupled intermediate stages, followed by a second detector valve.

Another circuit with a recognised title is the Ultra-Audion, which has been very frequently described in POPULAR WIRELESS. This is a selective single-valve circuit, in which grid and filament are joined across the series aerial-tuning condenser, reaction being obtained by direct feed-back from the plate of the valve into the aerial coil, as shown in Fig. 2.

The name Audion was originally applied to De Forest's first three-electrode valves, in which a fair amount of gas was occluded, but it is doubtful what was the exact meaning of the expression Ultra-Audion.

A component which certainly merits inclusion in a list of genuine Ultras and Supers is the "P.W." Ultra Coil. This is a tuning coil which may be of the solenoid or honeycomb type, in which two tappings are brought out from points in the winding equidistant from the two ends. The coil is thus an auto-transformer, but differs from the ordinary tapped coil, or double-slider solenoid, in that the structure is perfectly symmetrical, and balanced end effects are produced. The advantage of this is evidenced by the excellent results obtained from a simple crystal set using the device.

Super-Power Valves.

The majority of power valves at one time consumed a quarter of an ampere at six volts on the filament, and had an impedance of about 6,000 ohms. Other valves of different ratings followed, but the increasing appreciation of good loud-speaker reproduction has created an opening for a power valve capable of handling a grid swing of ten or twelve volts, with an output impedance suitable for working with a low-resistance speaker.

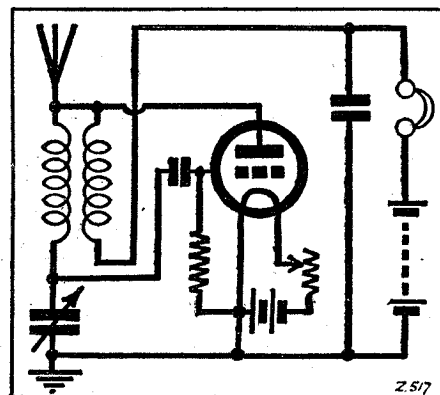
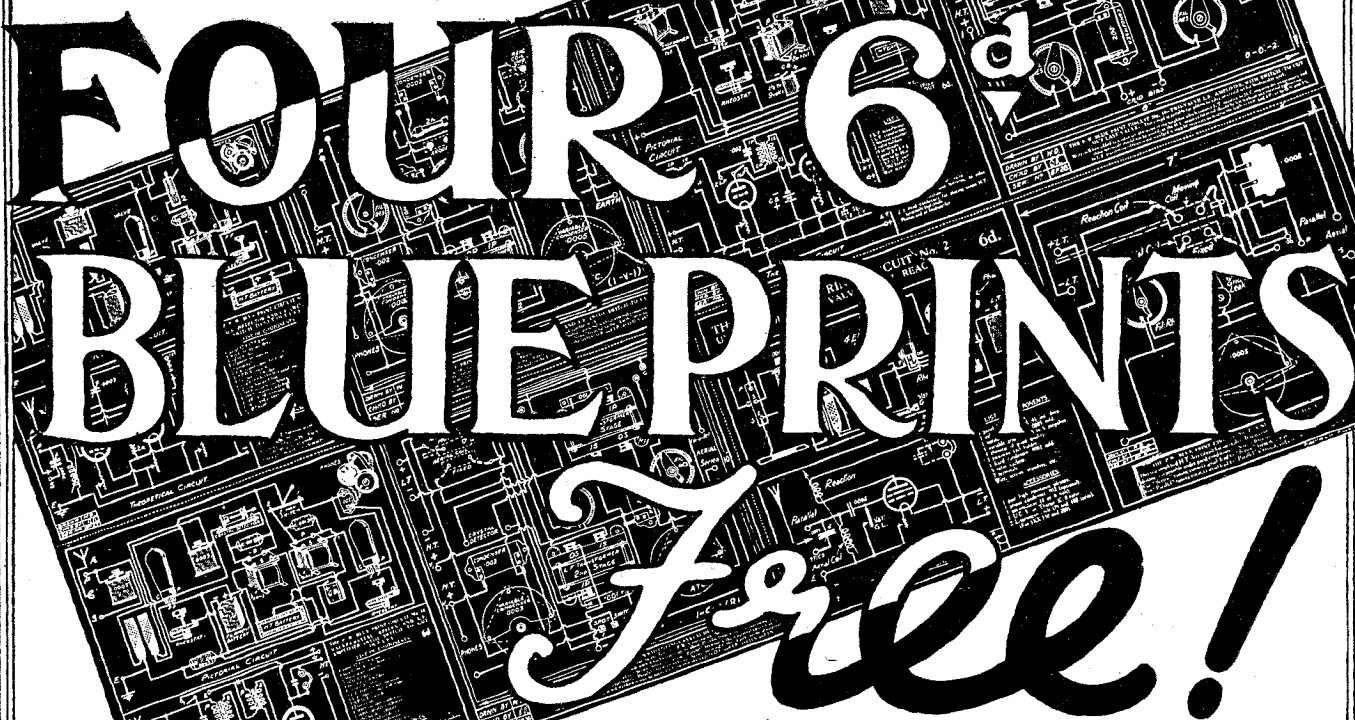


Fig. 2.—A popular one-valve circuit—the Ultra-Audion. The values of components are such as are to be found in an ordinary one-valve arrangement.

For this purpose most manufacturers now produce valves with an impedance of about 3,000 ohms, which can deal with large inputs without requiring excessive plate voltage. These valves, are known largely as super-power valves.



FOUR 6d BLUE PRINTS *Free!*

WITH NEXT WEEK'S "P.W." YOU WILL FIND FOUR NEW BLUE PRINTS—FURTHER ADDITIONS TO "P.W.'s" FAMOUS BLUE-PRINT SERIES. THESE LATEST BLUE PRINTS ARE AS FOLLOWS:—

"P.W." Blue Print No. 41. THIS YEAR'S CHITOS ONE-VALVER.—When originally introduced to the public through "P.W.," the "Chitos" scored a phenomenal success on account of its simplicity and sensitivity. Both these features have been improved in the modernised version now available for the first time.

"P.W." Blue Print No. 42. THE "Q. and A." THREE.—An ideal loud-speaker set for household use. The purity of reproduction is almost phenomenal, and to assist the veriest tyro in making the set it is described in the form of Questions and Answers. Easy to make, easy to operate, easy on the pocket!

"P.W." Blue Print No. 43. THE INEXPENSIVE FOUR.—Gives good long-range loud-speaker results at low cost. The circuit employed is a fast favourite: H.F. (neutralised), Detector, and 2 L.F. Amplifiers.

"P.W." Blue Print No. 44. THE ECONOMY FIVE.—Two high-frequency amplifying stages make this set exceedingly sensitive and selective, and two carefully designed L.F. stages give tremendous volume with great clarity of reproduction. (Even if you cannot build this set at the moment, *keep the Blue Print*—you will be sure to need it!)

**BLUE PRINTS
ARE
THE BACKBONE
OF
THE RADIO
CONSTRUCTOR'S
HOBBY.**

**ADD FOUR MORE
TO YOUR COL-
LECTION FREE
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Don't Miss This Great Gift Number!

THE ROW ABOUT "TALKS."

Mr. Bernard Shaw Hits the Nail on the Head—The Postmaster-General Sits on the Fence—The B.B.C. Directors Consider the Position—Nothing is Done—But the Remedy Remains.

By THE EDITOR.

THE storm in a teacup which arose over the banning of Captain Reginald Berkeley's play and the subsequent statements made by Mrs. Snowden has resulted in another fierce campaign in the newspapers over the whole question of controversial broadcasting.

As a result of the publicity searchlight switched on to the subject by the newspapers, the Board of Governors of the B.B.C. held a special meeting the other day to consider the whole question of censorship on controversial matter for broadcasting, after which they issued the following statement, which we publish in full:

"The Board of Governors of the British Broadcasting Corporation desire to state that the whole question of broadcasting controversial matter has had for some time past and is still having their careful consideration."

Sitting on the Fence.

The B.B.C. have sent out many announcements, but this may be regarded as their masterpiece. It contains absolutely nothing which may be said to be a contribution to the solution of the problem which is agitating not only the Press but all those who are interested in broadcasting.

The B.B.C. governors are undoubtedly in a very awkward position. They have been interpreting the Postmaster-General's instructions on the question of controversy in a way which, from the political point of view, has been quite safe. But they have forgotten that this point of view may not coincide with the point of view held by their numerous clients, and they have now been forced to realise that to play safe, and thus keep in the good books of the Postmaster-General, has its drawbacks, inasmuch as the majority of listeners are thoroughly dissatisfied with the broadcasting talks: not so much because they are talks, but because, lacking elements of controversy, they are, on the average, so full of milk and water that they are very uninteresting.

The real key to the situation is the Postmaster-General, and if anybody is to blame it is he. The Postmaster-General is sitting on a fence; instead of saying to the B.B.C. Governors: "Experiment with this controversial business, but don't go too far," he should have laid down one way or the other a fixed procedure, and then, if the public was dissatisfied with the ruling, he could definitely have been tackled in the House of Commons on the question.

As it is, the Governors of the B.B.C. are, to use a colloquialism, "getting it in the neck."

G. B. S. Hits the Nail.

There is not much doubt about it: if broadcasting is to become something more important than a source of amusement for congenial idiots and children in the nursery, future talks broadcast from Savoy

Hill will have to be much more controversial. Mr. Bernard Shaw has expressed what is probably the representative view on this question in saying:

"Whole Thing is Silly."

"If you are going to have broadcasting at all, you must have controversial broadcasting. Everything that is broadcast is controversial; even the weather is controversial sometimes. The whole thing is perfectly silly. Members of the Government have broadcast over and over again the most controversial matter, and the Government also took upon itself on one occasion to be very conspicuous in preventing me from broadcasting. I was asked whether I would undertake not to say anything controversial. I, of course, said I would not give any such undertaking, because, in the first place, I should be practically giving up my right of free speech and committing the sin of Esau. The whole thing is silly. I have no sort of patience with it at all."

That is probably what the majority of people think.

The whole thing is "perfectly silly," and people with intelligence cannot possibly have any patience with it at all.

But, nevertheless, if they want to see broadcasting improve they have got to have patience and they have got to make the Postmaster-General realise, and then the Governors of the B.B.C., that broadcasting talks without controversy constitute a mental pabulum which would disgrace the intelligence of the inmates of a lunatic asylum.

"Free" Speech.

This country has always claimed, as one of its great traditional rights, that of free speech; but broadcasting under the present form of control looks like becoming the very antithesis of that tradition.

And there are insidious signs that it is becoming more and more a potential weapon for political ends.

It has not been used by the Government as yet, except unofficially in the recent General Strike, but one can imagine what a tremendous force broadcasting would be for political purposes, and one can imagine how tempting it must be to the political powers that be to reserve this weapon and to keep a very tight rein upon its activities.

The result of this row about Captain Berkeley's play which led up to the review of the whole question of broadcast controversy has had very profound effects at Savoy Hill. There has been much talk of the resignation of Sir John Reith and of other high officials, and rumours of stormy Board meetings have been rife. There is no doubt that things are in a very unsettled state round at Savoy Hill, and that is inevitable when the camp is divided.

Sir John Reith, as Director-General, is undoubtedly a man who has a will of his own; but there are members of his Board who, much to his surprise, have lately given signs of the fact that they, too, have wills of their own, and the clash, which has long been anticipated by students of broadcasting, seems to have been precipitated by the recent publicity in connection with Captain Berkeley's play, Mrs. Snowden, and the whole question of broadcasting controversy.

Preponderance of Talks.

What the outcome will be it is as yet too early to say, but it is to be hoped that the indication given by the public that they are becoming rapidly "fed up" with the B.B.C.'s dictatorial attitude will have a salutary effect, and that Sir John Reith and all those in responsible positions at Savoy Hill will realise once and for all that they occupy their present positions as paid servants of the public, that it is not their prime mission in life to disregard that public and give it what it does not want, but to provide broadcasting programmes which, as the "Daily Mail" ballot showed, the majority of listeners prefer.

As Captain Otho Nicholson, M.P., pointed out in the "Daily Mail" the other day, comparison with the "Daily Mail" ballot result and with the programmes as published in the "Radio Times" is illuminating. To quote Captain Nicholson: "Whereas the express desire of the ballot placed talks of various kinds fifth and eleventh on the list, with an allowance of eleven per cent. in all of the total, the analysis shows that talks stand easily first in point of time occupied, with twenty-three per cent."

Public Merely Bored.

It would not be so bad if the talks contained elements of controversy. They would then be interesting, inasmuch as people would disagree about them. But as it is, the majority of people agree at least on one thing about the talks as they are broadcast to-day, and that is that they are dull. Nothing could be more damning.

Many of the subjects which form the basis of talks to-day could be made extraordinarily interesting, but when a namby-pamby attitude is adopted, and any "argument" put forward is strictly non-controversial, then inevitably the reaction of the public to such items must be one of weariness. It is up to the B.B.C., and especially to Sir John Reith and the Directors, to interpret the Postmaster-General's rather vague ruling as regards controversy a little more courageously. The public are with them, and it is much better to take up one definite, firm attitude than to make announcements of the vague and evasive type which we quoted at the opening of this article.

The Remedy.

"The whole question of broadcasting controversial matter has had for some time past, and is still having, the careful consideration of the Board of Directors": no one doubts this, but surely it is time that this "consideration" reached maturity, and that a decision, one way or the other, should be made immediately? If not, the least those in authority at Savoy Hill can do is to hand in their resignations.

IS YOUR SET "FLEXIBLE"?

There is no reason why your receiver should not be capable of considerable versatility, says the author, provided it has been carefully chosen and constructed.

By W. L. S.

IT is often stated nowadays that, wherever possible, a set should be constructed for one specified job, and kept for the purpose of doing the work for which it was originally intended. A receiver constructed for the purpose of working a loud speaker on the local station, say many of the "experts," cannot be expected to give really good DX reception on headphones.

The reasons for this are by no means clear. In the writer's opinion, it is merely a form of prejudice that has unaccountably sprung up and has to be lived down. If a set is sensibly constructed in the first place, surely there is no conceivable reason why it should not be used for a host of different requirements, and, further, there is no reason why it should not meet them all fairly well. By this it is not meant to

detector circuit. Short-wave coils with the turn numbers mentioned above may quite conveniently be fixed to plugs of the standard two-pin type, or may be obtained ready-made from Igranic Electric, Ltd., and other firms.

If the set will not oscillate (with the aerial disconnected, of course), the detector part of the circuit should be carefully rewired, noting the following points in particular:

Two Important Points.

Keep the lead from the grid of the valve to the grid condenser, and also that from the other side of the condenser to the coil, as short as is humanly possible.

Keep the coils as far as possible from any metal objects in the set, such as variable condensers, transformers, or even panel brackets.

There should now be no difficulty in persuading the receiver to oscillate on short waves. The first thing that will be found, however, will probably be that the tuning is so critical that it is almost hopeless to tune in and hold a station at all. Naturally, the variable condensers are much too large. There is, however, no necessity to scrap them, for by the simple expedient of connecting a fairly small fixed condenser in series with the variable, the latter may be made to suit any purpose. Thus a variable condenser of .0005 capacity may be given an effective capacity of .00025 by connecting a .0005 fixed condenser in series with it. If a very small fixed condenser (say .0001 capacity) is put in series, the effective capacity of the variable will be something just under .0001.

A very neat way of doing this is to connect one of the "clip-in" holders for interchangeable fixed condensers between the fixed plates of the variable and the point to which they are connected (the grid condenser, in the case of the A.T.C.). Then for broadcast reception a shorting strip may be inserted in this holder, and a fixed condenser of suitable capacity for short-wave work.

This is quoted more or less as a good example of what can be done with a little thought towards improving the utility of a set that is being used for one purpose only. There are, of course, many similar instances. There is the old trouble of L.F. amplifiers. Plugs and jacks have, of course, made it a simple matter to put the required number of note-magnifiers in circuit, but in the

writer's opinion it is far preferable to revert to the old-fashioned scheme of using a separate amplifier.

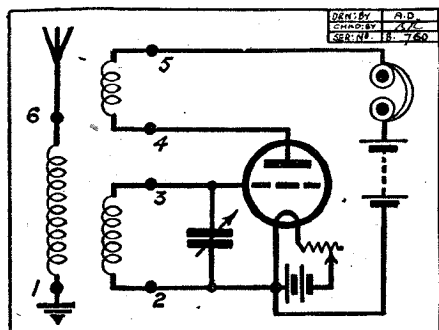
After all, once an L.F. amplifier has been persuaded to give a respectable amount of volume coupled with good quality of reproduction, there is nothing more to be done to it! This being the case, it is difficult to imagine why we scrap a complete three-valve set in order to try another circuit, and then build up another set, the L.F. portion of which is identical with that previously in use, with the exception, perhaps, of the layout. Why not spend a week or so in building a really good self-contained L.F. amplifier consisting of two stages with plug and jack switching to provide one only if necessary? This may be built in a cabinet with the necessary grid-bias batteries, etc., self-contained, tucked away on a shelf somewhere, and forgotten! Leads may be run to the testing table, and the note-magnifier may then be brought into action on the tail end of any receiver that one likes to try out.

It is impossible to do this with H.F. amplifiers, since one can never say when one has struck the most satisfactory arrangement. After all, the only test of an H.F. amplifier is a long search round the distant stations, whereas the local station is good enough for the purpose of testing a note-magnifier. There are, of course, some who have decided on note-magnifiers as the subject of their experiments, and naturally the above remarks are not addressed to them.

Using Six-Pin Coils.

The word "flexibility" is rather apt to conjure up visions of those "pre-broadcast" receivers with 24 knobs and dials arranged in a neat row on the front panel, with switches for connecting the bottom end of the grid-leak to almost any point in the set! That, however, was carrying things to extremes. All that is wanted nowadays is a good opportunity to experiment with certain components without tearing the entire receiver to pieces.

The six-pin base coils now on the market

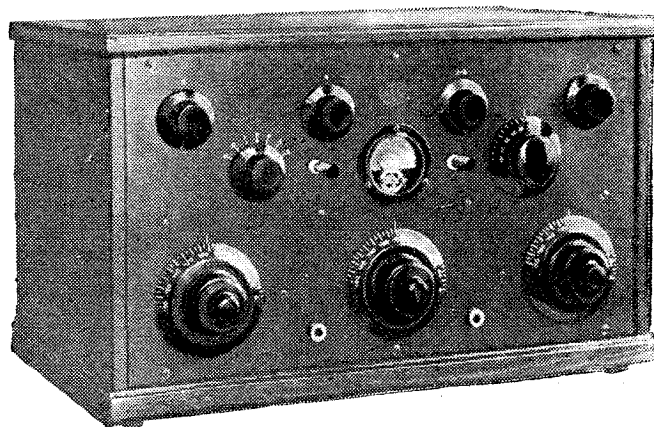


Showing the points to which a six-pin coil can be connected in a conventional circuit in the first step towards the modification suggested in the accompanying article.

imply that a set comprising a detector and two stages of L.F. must be expected to bring in all the European stations on the loud speaker, or that a four-valve neutrodyne must be expected to work on short waves. Much may be done, however, with a set to make it "flexible."

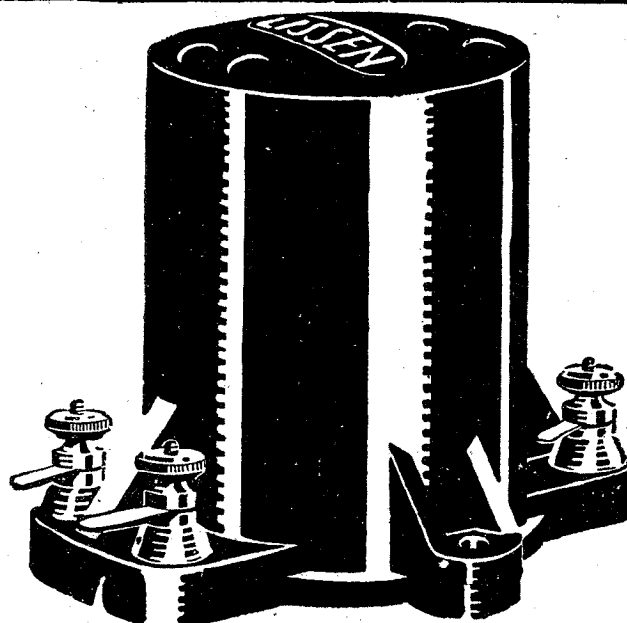
Receiving Short Waves.

Take, for instance, the matter of converting a broadcast receiver for short-wave reception. For the purpose of convenience, we will suppose that it is a simple "detector and mag." receiver. We are not, as a matter of fact, concerned with the number of note-magnifiers, since this should have little or no bearing on the performance of the receiver itself. In the first place, there should be no broadcast receiver of this type that refuses to oscillate down as low as, say, 30 metres, on account of the high capacity of the wiring, or the losses in the coil holder and condensers. If this does happen, then the design of the broadcast receiver was definitely bad in the first place, and any alterations made will be bound to improve it. It is, in fact, a good test of a receiver of this type to plug in two very small coils (such as a four-turn in the A.T.I. and a six-turn in the reaction), and see whether it oscillates smoothly. If it does, there is not much wrong with the



There are thirteen dials, sockets, and other such things, as well as a milliammeter on the panel of this early type of receiver. This, however, would now be regarded as "carrying things to extremes." One of the first essentials in the design of a modern receiver is that its panel controls should be reduced to a minimum.

are very excellent aids to "flexibility," since three windings may be accommodated on one former (which may be bought "blank"), the ends of these windings taken out to the six pins, and almost any detector arrangement arranged for.



SOLITARY AND SUPREME—

YOU may think there can be no better transformer for the circuit than the one specified in the booklet to whose instructions you are building—until you remind yourself that there are many advertising manufacturers each of whom you will find obtains a share of use and mention of his products. Then you will understand that the best transformer and other parts have not necessarily been specified. You may think you have to pay a high price before you can get a transformer capable of yielding amplification of the kind that will please you. This may have been so before the new LISSEN came, but now it is so no longer.

Try the new LISSEN, we give you a 7 days' test.

If within that time you do not prefer the new LISSEN Transformer for tone purity and power to any other transformer, irrespective of price, against which you may test it, return it within a week of purchase and your money will be refunded.

GUARANTEED FOR TWELVE MONTHS

Turns Ratio 3 to 1. Resistance Ratio 4 to 1.
Use it for 1, 2 or 3 stages L.F. It is suitable for all circuits and valves you will want to use.

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In its conception, in its price, in its popularity, this new LISSEN is solitary and supreme. It is saving set builders £30,000 a month in the purchase of their transformers alone.

It will save you money and MORE THAN SATISFY YOU.

RELY ON YOUR OWN JUDGMENT WHEN BUYING, CHOOSE
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Managing Director: Thos. N. Cole.

THE "PROGRESSIVE" FOUR.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have been a regular reader of POPULAR WIRELESS since its inception, and I have been building the "Progressive" Set as it went along, and found it very good indeed, and so simple that the veriest amateur could follow it all.

As a one-valver I brought in several European stations as well as at least six English, and, of course, 2 R.M. I went on step by step till now I have the best four I have ever had. I tune all stations on L.S. and on a test of one hour I tuned in Dublin, London, 5 G B, Cardiff, Manchester, Glasgow and Liverpool, and also several European stations, notably Rome, Madrid, Oslo, and at least three German and others unidentified.

I thank you for this wonderful yet simple set. No matter what power I put on I simply *can't* distort. I am situated in rather a bad situation here in one corner of Wexford, and my aerial is badly screened.

Yours,

M. O. G.

Tomhaggard, Co. Wexford, I.F.S.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am writing to tell you that I have put on the "Progressive" Four set described in your paper. It is a grand set, and after I had finished it last night, after the British stations had closed down, I got four foreign stations at loud strength on the loud speaker, I then got a station singing in English, and when he announced, he said, "W G Y, Schenectady, New York, broadcasting from Central Park." The wave-length was about 350 metres.

To-day I tried the set out and got about fourteen normal wave stations on the loud speaker and seven on the long waves. The tone is lovely, and the only fault is that Manchester can be heard on the stations on shorter waves than Manchester. I live about eight miles from this station.

Thanking you very much for the splendid circuit, and wishing your paper every success. I remain,

Yours faithfully,

H. W.

Ashton-under-Lyne,
Lancashire.

The Editor, POPULAR WIRELESS.

Dear Sir,—As a very satisfied constructor of your "Progressive" Four, may I write and thank you very much for the exceedingly clear instructions; I find the result A1, and so does everyone who has heard it, so much so that I have two friends who have started to make one also. I varied many of the makes of the different components; my chokes are all R.L. Varley, my transformer a Eureka concert grand, my variable condensers Ormond, fitted with their slow-motion control on aerial and tuning condenser. I used an ebonite panel (it was easier to get than a wooden one); I use P.M. 4-volt valves (two P.M.3, one P.M.4, and one P.M.254), the correct grid bias and H.T. accumulators. Volume, purity and clearness are all that can be desired, and to say I am delighted with it is to put it mildly, and feel I must add my thanks to the very many you must have had.

Yours faithfully,

(Mrs.) E. L. M.

Near Oxford.

**SOME INTERESTING
RADIO JOTTINGS.**

THE American naval wireless stations handle ordinary commercial messages from American ships in order to promote good working between the Navy and Mercantile Marine in case of emergency.

The British Admiralty have now issued a new Order in Council providing for a payment of halfpenny for every ten words in commercial messages handled by naval ratings, at certain coast stations.

The erection of a wireless station at Godhaven, Greenland, has resulted in a radio boom among the Esquimaux.

It has recently been proposed that public libraries should be equipped with wireless receivers so that the general public could attend radio lectures and educational talks.

As no doctor lives upon the island, the inhabitants of Juan Fernandez (near Valparaiso) have installed wireless so that if anyone should fall ill, the symptoms could be described by radio to the Valparaiso doctors.

CORRESPONDENCE.**THE "PROGRESSIVE" FOUR****THE "Q. & A." SET—SHORT-WAVE
RECEPTION.**

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 "Q. AND A." SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—I recently constructed the "Q. and A." set, and it has worked splendidly right from the start. It took me four hours to complete it. I receive 5 X X, 5 G B, and 2 Z Y on loud speaker, and have had 5 S C, 2 R N, 6 B M, 2 L O, and 2 B E on 'phones, besides a number of foreign stations. Some of the Continentals come in better than our own. My first attempt at making a valve set was the "Inexpensive" One-valver. This was a complete success, and I get as many stations as on the larger set. Your wireless journals are A1, and are very helpful indeed to the constructor. By the way, I get better results—much better on both sets—by connecting L.T. the opposite way round from that specified in the paper.

Again thanking you.

Yours sincerely,

J. S.

Northwick, Cheshire.

"H.T. ECONOMY."

The Editor, POPULAR WIRELESS.

Dear Sir,—Re the above subject in a recent "P.W." I thoroughly agree with P. Harris regarding H.T. economy. I am sure there must be thousands of valve users who put half-used batteries in the dustbin.

I have used batteries in the suggested way, only with this improvement.

When the new battery voltage drops I immediately break open the cardboard container enclosing battery, and make a small hole in each zinc container and squirt some strong sal ammoniac solution into each container with an ordinary glass squirt with rubber ball.

Close up the holes again, stick on the covers again, and leave it for a fortnight to settle; then put it in circuit again when you will find it as good as new.

After giving it this "monkey-gland" treatment a few times, or the zinc containers start to break up. I immediately disconnect the bad cells and convert them into ordinary Leclanche wet cells, when their life is completely renewed again.

In changing over from one system to another you can always have a spare battery to put in use when special occasions arise.

With best wishes to POPULAR WIRELESS,

Yours sincerely,

Wm. M.

Motherwell, Scotland.

"A SHORT-WAVE ADAPTATION."

The Editor, POPULAR WIRELESS.

Dear Sir,—May I be allowed a little space in your "Correspondence" column to reply to Mr. Murray, of Forres, Morayshire, on the subject of "A Short-Wave Adaptation?"

I may say I followed this practice during last winter with fair results. I have also received 2 X A F by connecting leading-in wire to the window snib instead of to the lead-in tube. If Mr. Murray would desire a really good short-wave set, then I advise him to wire up Circuit "P.W." Blue Print No. 31, given free with "P.W." for week ending Oct. 15th, 1927. For short-wave coils I use No. 16 S.W.G. wire wound on a 1-lb. jam jar and then threaded through small pieces of ebonite which will space the wire and also keep the coil rigid. Using L1 3 turns, L2 4 or 6 turns, and L3 6 turns I can tune in 2 X A F at about R4 to R6 with ease. With this circuit hand and body capacities are practically unknown. I can walk about the room wearing headphones without making any alteration in the tuning, which is so common on short waves. I can thoroughly recommend "P.W." Blue Print No. 31 for all wave-lengths from above 15 metres to the Eiffel Tower, or higher, if required. I have also had 2 F C, Sydney, twice at about R2 or R3. Thank you for Blue Print No. 31, and best wishes to POPULAR WIRELESS.

Yours respectfully,

J. A. A.

Carlisle, Cumberland.

SHORT-WAVE RECEPTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have not seen many reports concerning one-valve short-wave sets, and I am writing to tell you of my experiences with a one-valve Reinartz. I believe you published the circuit some time ago, and I must congratulate you for doing so. It is very efficient. I just "hooked up" the set about a week ago and have had many short-wave stations. English amateurs come in well on 45 metres during the daytime and at dusk the Continental stations begin to come in. The crowning success came, however, on Saturday, January 7th, when 2 X A F was received direct on 32.79 metres.

I began listening at 11.30 p.m., and within a minute had picked up this transmission. After a 'cello solo the familiar American accent was recognised when the call-sign and wave-length were announced. The schedule for the next week was announced, and after that Morse signals were transmitted. I don't know what the next item was, as I closed down, the time being 12 p.m.

When I first picked up 2 X A F the signals faded at regular intervals, only to appear again with their former strength a few seconds later. Every word of the announcer was heard. The strength of the music varied from R2-R5 and the speech came in at R4.

This is my first experience of short waves and I am sure I shall not desert them. The condensers used were not fitted with slow-motion dials, but, however, tuning was not difficult. Again thanking you for publishing this circuit, and wishing "P.W." every success.

Yours truly,

J. K.

Manchester.

CAUSE OF DISTORTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have read several articles lately in "P.W." on the causes of distortion, and I thought perhaps my experience might interest your readers. I had been getting distortion from my set (a four-valver) for some time, and had tested and tested everything until I felt like putting the set in the dust-bin. Eventually I found it. My tuning is carried out with one dial working a two-gang condenser, and you will know that one set of moving vanes can be moved round the common spindle a few degrees by easing a small set screw and using a tommy supplied for the purpose with the condenser. By continued use (or misuse) these vanes had moved just a shade, thereby throwing the two circuits out of balance. It was not enough to lessen the volume, but just enough to cause the distortion. On readjusting, all trace of distortion disappeared. Wishing "P.W." continued success.

Yours faithfully,

W. T. S.

Havant.

Technical Editor's Note.—It would appear to us that the adjustment made by W. T. S. threw the condensers "OUT OF BALANCE." The distortion was probably due to the clipping of sidebands caused by an approach to oscillation. It is more probable that the two circuits were balanced in the first instance.

**PRACTICAL ITEMS FOR
YOUR NOTEBOOK.**

THE steel of an ordinary drill may be hardened by heating it up to a dull redness, and then immersing it suddenly in a vessel containing a quantity of heavy lubricating oil.

An oscillating receiver spoils programmes not only of the owner but of his neighbours.

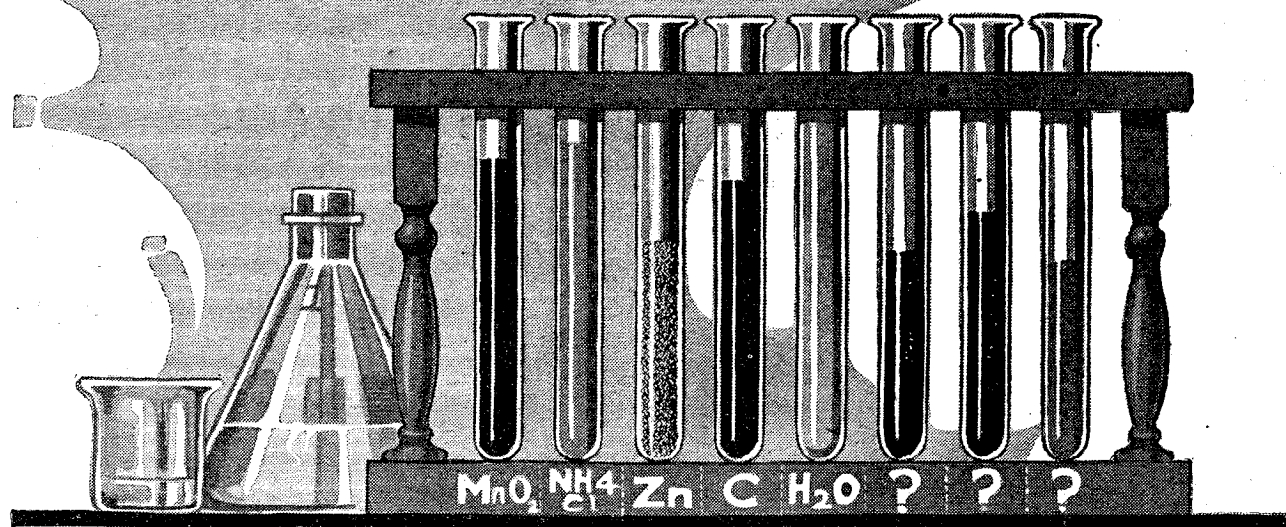
The tuning of a long-wave broadcast receiver is necessarily much flatter than the tuning of a short-wave station?

To test if a pair of telephones are in good order, wear them in the ordinary manner and place one of the tags between the lips. If a key or similar piece of metal is now rubbed against the other 'phone tag a scratching sound will be heard in the ear-pieces corresponding with the rubbing of the key, if the 'phones are in good condition.

The commonest cause of howling and distortion in a set is an H.T. battery which needs replacing.

The golden rule of radio is: Never adjust or alter anything inside the set without removing the H.T. negative plug.

THE SECRET IN THE TEST TUBES



What are the secret chemicals?

YOU KNOW THAT TEST TUBES and the minds of chemists have held secrets which have baffled discovery, but you may not know there have been none more sought after by battery makers than the one so jealously guarded inside each cell of the LISSEN New Process Battery, which makes each cell yield oxygen for your valves in a way *no other cell* does or has ever done before. Copious does not adequately describe this oxygen liberation of the LISSEN New Process Battery.

Since this new energy became available for valves tens of thousands of loud speakers all over the country are reproducing radio broadcast with a freshness of tone and a clear volume which is adding delight to radio. Whenever there is fine music to be heard by broadcast see that you have a LISSEN New Process Battery in your set and hear your loud speaker voicing its appreciation.

10,000 radio dealers are selling the Lissen Battery at a price which has been made low to bring it within the reach of all.

The next time you want a good battery get a LISSEN New Process Battery. Take no other and you will be rewarded for your insistence by a new power smoothness and new tone clarity in your loud speaker.

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

LISSEN

SECRET PROCESS

BATTERY

NEW SIZES

Lissen 4½-volt Pocket flash-lamp battery, 5d. each.

LISSEN SUPER POWER 60-volt (reads 66 volts) The battery for big sets, 13/6.

LISSEN LIMITED, 8-16, FRIARS LANE, RICHMOND, SURREY.

A Home-made Met-Vick Four

For working off the Electric Light Mains

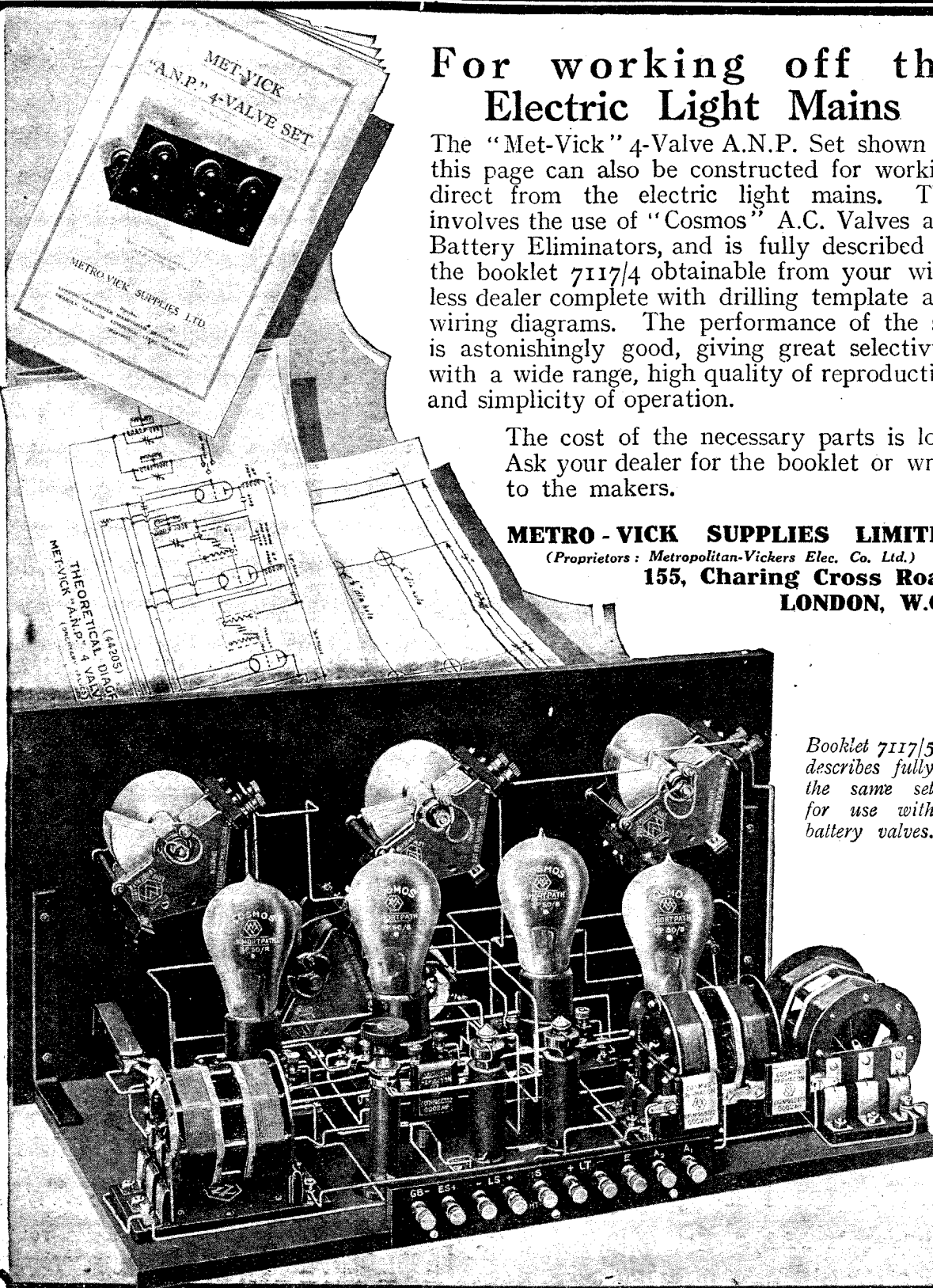
The "Met-Vick" 4-Valve A.N.P. Set shown on this page can also be constructed for working direct from the electric light mains. This involves the use of "Cosmos" A.C. Valves and Battery Eliminators, and is fully described in the booklet 7117/4 obtainable from your wireless dealer complete with drilling template and wiring diagrams. The performance of the set is astonishingly good, giving great selectivity with a wide range, high quality of reproduction and simplicity of operation.

The cost of the necessary parts is low. Ask your dealer for the booklet or write to the makers.

METRO-VICK SUPPLIES LIMITED

(Proprietors: Metropolitan-Vickers Elec. Co. Ltd.)

155, Charing Cross Road,
LONDON, W.C.2



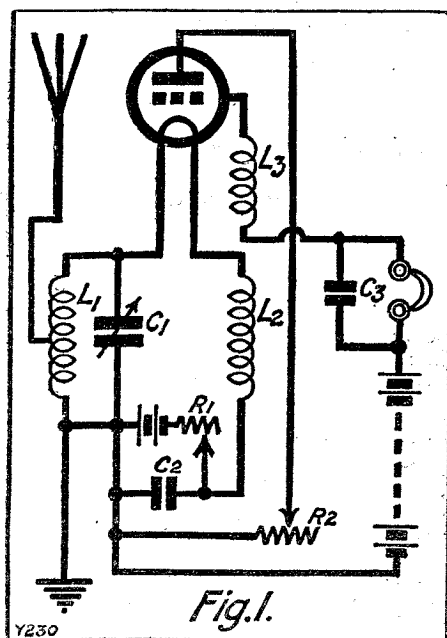
Booklet 7117/5
describes fully
the same set
for use with
battery valves.

Sidelights on the Filadyne

In which are disclosed some new and interesting applications of a highly efficient and interesting method of detection originally due to our Technical Editor.

By J. ENGLISH.

THOSE of you who have constructed Filadyne receivers or experimented with the various circuits will occasionally have come across phenomena which seem to bear no relation to previous experience with ordinary valve receivers. Although the Filadyne receivers are quite as sound in theory and as efficient in practice



as the best of ordinary valve sets, the very nature of the scheme must at times give rise to operating features which seem unusual. In attempting recently to clear up a few theoretical problems of the Filadyne, several instances occurred where something which at first appeared unusual proved to be in accordance with accepted ideas.

Reaction Control.

Take, first of all, the latest circuit, reproduced in Fig. 1. This contains a valuable feature due to the original inventor, Mr. Dowding, in that reaction is controlled in a strikingly effective and simple manner by the variable resistance R_2 . For a single-valve receiver with reaction, the circuit could not be much simpler. Now, although reaction is partly controlled by the variation of anode potential produced by altering R_2 , there are other factors at work, as we shall see.

If an H.F. choke is substituted for R_2 no reaction effects at all can be produced whatever the anode potential. If the choke is shunted by a variable condenser, however, reaction commences as the capacity is increased. Since increasing R_2 in Fig 1 to maximum completely stops oscillation, it would appear that no reaction can be obtained where the anode circuit contains anything producing an H.F. isolation of the anode, such as an H.F. choke or a large resistance.

Now, in the Filadyne the anode is part of the input circuit, which is connected to the filament and anode instead of to the grid and filament as in the ordinary valve circuit. In the latter we know that isolating the filament end of the tuned grid circuit from the filament results in poor signals and often absence of reaction. Similarly, in the Filadyne, the anode is essentially the "filament" end of the tuned circuit, and, with a fixed reaction coupling between L_3 and L_2 varying the degree of H.F. isolation of the anode must naturally produce a variation in the amount of reaction.

Another feature which has been rather overlooked is that an H.F. current circulates between the anode and the actual filament of the valve. From Fig. 1 it is

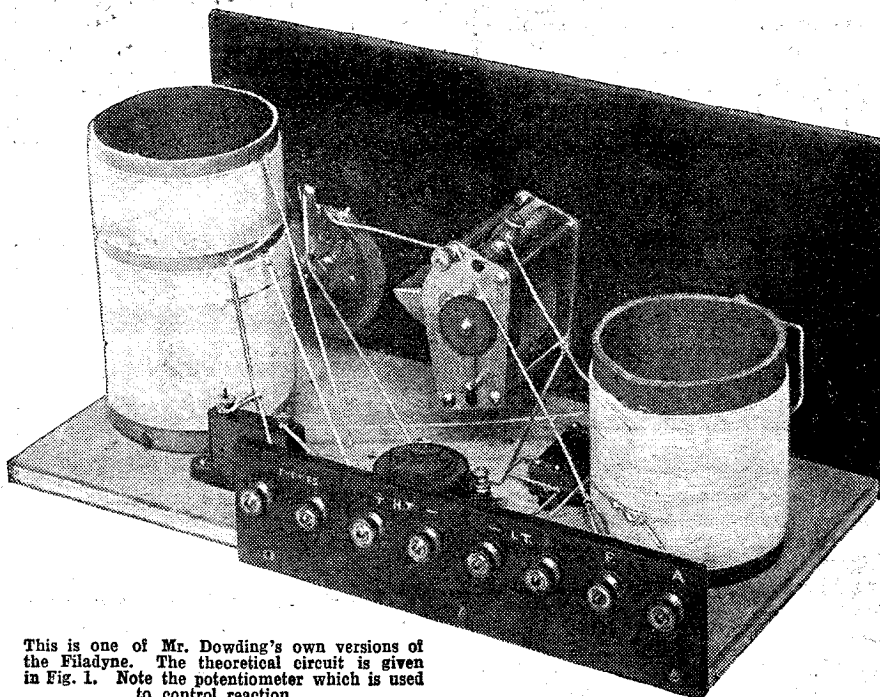
obvious that this current must pass through the coils L_1 and L_2 , and in certain circumstances this alone is sufficient to produce oscillation without any reaction coil in the grid circuit.

Another Method.

This can be demonstrated very effectively by a receiver having the circuit arrangement of Fig. 2. Here the anode is connected to the mid point of the coil L_3 , and under these conditions the circuit oscillates violently. Without going too deeply into the reason for this, it would appear that the anode and grid currents flowing through L_1 and L_2 are now properly proportioned for the reaction effect. There also appears to be an H.F. relation between the anode and grid, as reaction is difficult to obtain without a condenser across the 'phones.

Any form of variable H.F. isolation of the anode will now control reaction as before. For instance, an H.F. choke inserted in the anode lead at AB stops oscillation and reaction, while shunting this choke with a variable condenser immediately produces a simple reaction control. Mechanically and electrically this is not so good as the control

(Continued on next page.)



This is one of Mr. Dowding's own versions of the Filadyne. The theoretical circuit is given in Fig. 1. Note the potentiometer which is used to control reaction.

SIDELIGHTS ON THE FILADYNE.

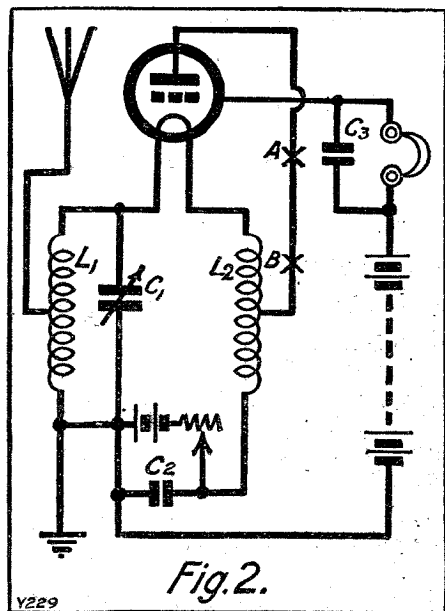
(Continued from previous page.)

by the resistance R_2 in Fig. 1. A more practicable and simpler method than the shunted choke is to connect a separate coil to the anode, couple this coil to L_2 with the variable resistance between the bottom of the coil and L.T. positive. The resistance then controls reaction in a similar manner to Fig. 1.

Anyone who has not a suitable resistance can join the bottom of the anode coil direct to L.T. positive, or to the bottom of L_2 for some valves. The anode coil and L_2 should then be mounted in a two-way holder, when varying the coupling between the two coils will control reaction in the same way as the usual swinging reaction coil. The windings of both coils should be in the same direction, changing the connections to the anode coil if reaction is not obtained.

Resistance Coupling.

The few features described so far tend to show that the Filadyne is not so very unorthodox so far as reaction effects are concerned. There is another feature which up to the present has not been disclosed. This is the ability to use the Filadyne valve as a resistance-capacity-coupled amplifier. Experiments which I have been carrying out recently show that the Filadyne can be used quite successfully in this direction. When we consider the steep characteristic curves possessed by some valves under Filadyne conditions, thus

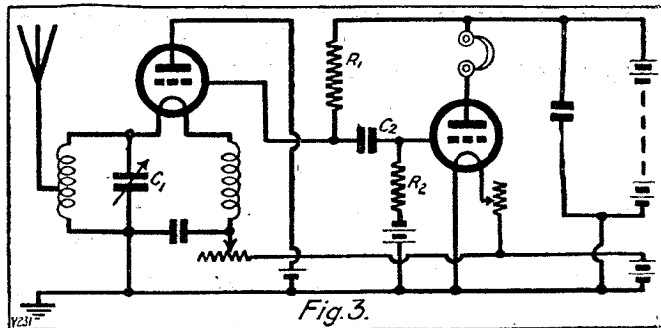


demonstrating a high magnification factor, we naturally expect a good performance in an R.C. amplifier. The volume obtained is not, perhaps, so great as that given by the ordinary circuits with proper high-mu valves. However, the circuit is extremely interesting, and reproduction is full and rich in tone.

The scheme for resistance-capacity coupling is given in Fig. 3. Using a D.E.2

L.F., the "anode" resistance R_1 may have a value as high as 2 meg., C_2 being then .003 mfd. and R_2 5 meg. The "anode" voltage need not be increased much beyond 75 volts, but the filament current of the Filadyne valve must be reduced considerably below the normal value. That peculiarity of all Filadyne circuits, the loss of signals when the filament current is increased beyond a certain value, is quite noticeable here, the correct value now being very low. This produces a further economy in current, the drain on the H.T. battery also being considerably reduced.

The Filadyne is now operating as a voltage amplifier, very similar to an ordinary R.C. coupled detector, except



that we are using different electrodes for the H.F. input and L.F. output.

The working potential of the anode has some effect on amplification, and for different valves the anode should be connected to filament negative or positive or given a slight additional bias until best results are obtained. For the valves I have used positive anode bias gave the best results.

An interesting point in regard to valves is that the high-mu R.C. valves give extremely poor results in this circuit. The design of their electrodes happens to be unsuited to Filadyne conditions, a more open grid mesh being required.

Up to the present I have been unable to obtain reaction effects from this circuit, and when reaction was required a separate reactor valve had to be used. Perhaps some of my readers will be able to evolve a scheme for obtaining a satisfactory reaction scheme, although, as far as I can see at present conditions are against success in this direction.

Saving Space.

However, as it stands, the two-valve receiver of Fig. 3 is quite a good one for local loud-speaker reception.

In conclusion, there is just one point about the filament coils of the Filadyne circuits to which I should like to draw your attention. These two coils are usually wound on separate formers, but for normal wavelengths both coils can be wound on a 4-in. diameter former, thus economising space. When this is done, the best results are obtained by winding the two coils in opposite directions.

The two ends in the middle then go to the filament terminals of the valve holder, and the outside ends to L.T. negative and rheostat respectively. The tuning condenser is joined across either coil, preferably the one connecting to L.T. negative.

FOR YOUR NOTEBOOK.

ONE of the commonest causes of poor reception is that one or more valves in the set have lost emission. (Very often this trouble is caused through the use of excessive filament voltage.)

Although an insulated wire round the picture-rail will make quite a good indoor aerial, much better results can sometimes be obtained by the use of several wires running parallel to each other, 18 inches or so below the ceiling.

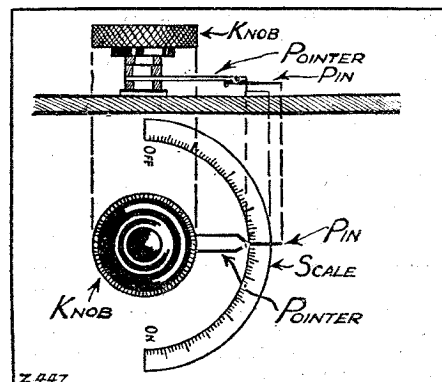
When a pair of 'phones or a loud speaker have become demagnetised and insensitive, the makers or firms specialising in that class of work can often re-magnetise and restore them.

If you use a power valve you cannot expect an ordinary H.T. battery to supply its anode current. For such a valve you will need a triple-capacity battery or else some form of H.T. battery eliminator.

If the strength of reception on a crystal set falls off because the crystal is getting dirty, you can give the set a new lease of life by breaking the crystal in two and using the new clean surface which is exposed.

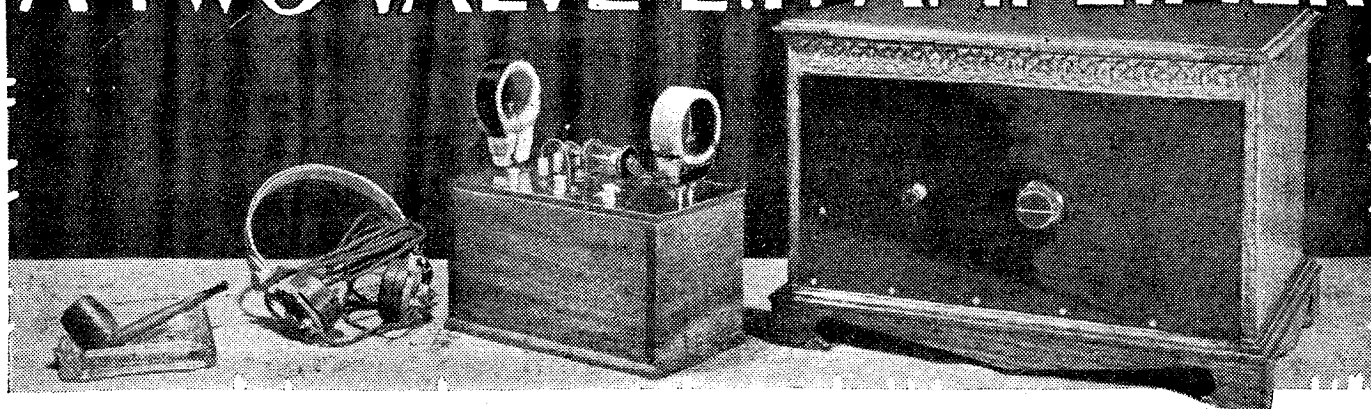
OBTAINING CLOSE READINGS.

FOR obtaining close readings on vario-meter and filament resistance pointers it is useful to solder a pin or piece of wire to the underside of the pointer as



shown in the diagram. The pointer can then be bent down till it just clears the scale.

A TWO VALVE L.F. AMPLIFIER



MOST listeners at some time or other want to work a loud speaker.

Possibly they may be under the impression that it is necessary to build a completely new set. Let me say at once that this is quite incorrect. If the existing receiver is capable of giving decent tele-

POINT-TO-POINT CONNECTIONS.

One filament socket of each valve holder to one side of each of their respective rheostats.

Remaining sides of the rheostats joined together and to one side of the L.T. switch.

Other side of L.T. switch to the L.T. + terminal.

Remaining filament socket of the 1st valve holder to the L.T. — and H.T. — terminals, to the G.B. + plug via a flexible lead, to one side of the 2-mfd. Mansbridge condenser, and to the remaining filament socket of the 2nd valve holder.

Right-hand "input" terminal (looking at terminal strip from back of base-board) to the "H. T. + " terminal on the R.C.C. unit and to one tag of the .0001-mfd. fixed condenser.

"P" terminal on R.C.C. unit to the left-hand "input" terminal.

Remaining tag of the .0001 mfd. fixed condenser to the centre terminal (to the terminal fitted between the two "inputs").

"G" terminal on R.C.C. unit to the grid of the 1st valve holder.

"—" terminal on R.C.C. unit to the G.B. — 1 plug via a flexible lead.

Plate of the 1st valve holder to the "plate" terminal on the L.F. transformer.

"H.T. + " terminal on transformer to the remaining tag of the 2-mfd. Mansbridge condenser, to the L.S. + terminal and to H.T. + terminal on the terminal strip.

"Grid" terminal on transformer to one end terminal on the volume control (potentiometer).

Other end terminal on volume control to the G.B. terminal on transformer and to the G.B. — 2 plug via a flexible lead.

Grid of the 2nd valve holder to the centre terminal (arm) on the volume control.

Plate of the 2nd valve holder to the L.S. — terminal.

This completes the wiring.

This is an amplifier which you can hook on to practically any existing set, including a crystal outfit, if you desire loud and clear loud-speaker results. It is a high-grade amplifier designed for low-grade pockets.

By the "P.W." Research and Construction Department.

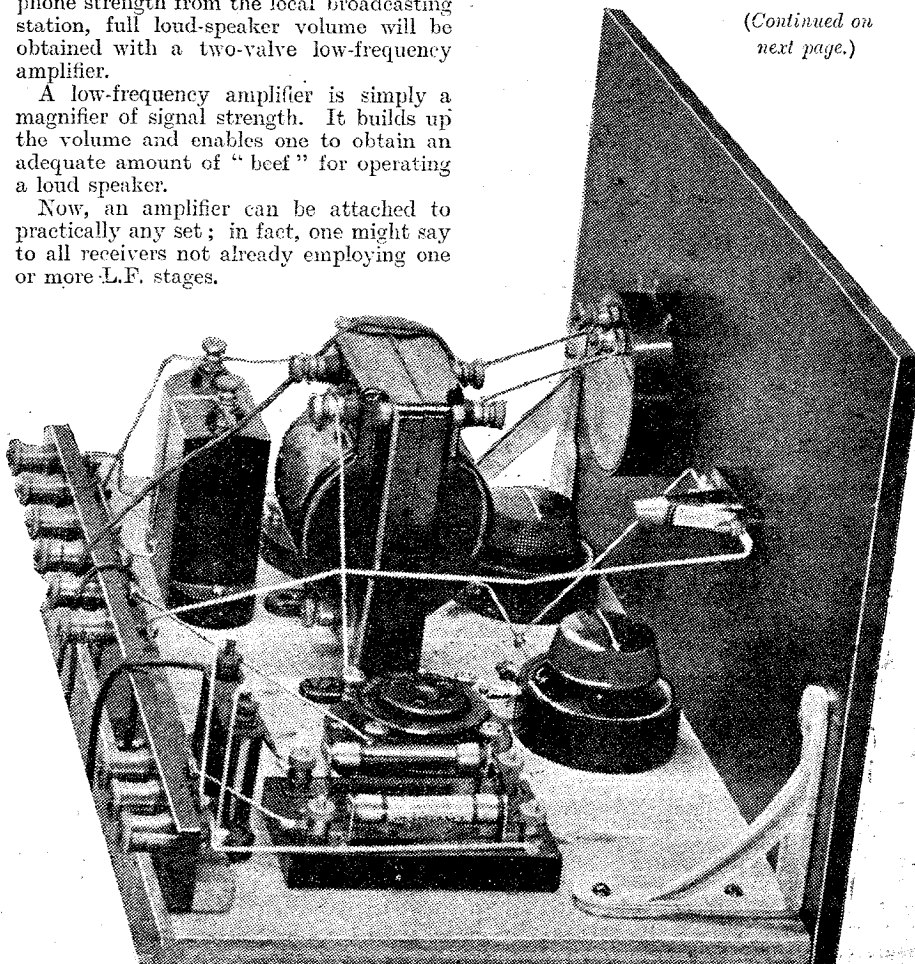
In certain cases it could even be used after an existing low-frequency valve. However, the type of listener most in need of an amplifier is he who has an existing one-valve or crystal set, and for these listeners this particular unit is ideal. It will give first-class quality and at the same time plenty of volume. I do not intend to go into the question of design, because I have a feeling that the average reader will prefer not to be bothered with the theoretical considerations. Briefly, the

phone strength from the local broadcasting station, full loud-speaker volume will be obtained with a two-valve low-frequency amplifier.

A low-frequency amplifier is simply a magnifier of signal strength. It builds up the volume and enables one to obtain an adequate amount of "beef" for operating a loud speaker.

Now, an amplifier can be attached to practically any set; in fact, one might say to all receivers not already employing one or more L.F. stages.

(Continued on next page.)



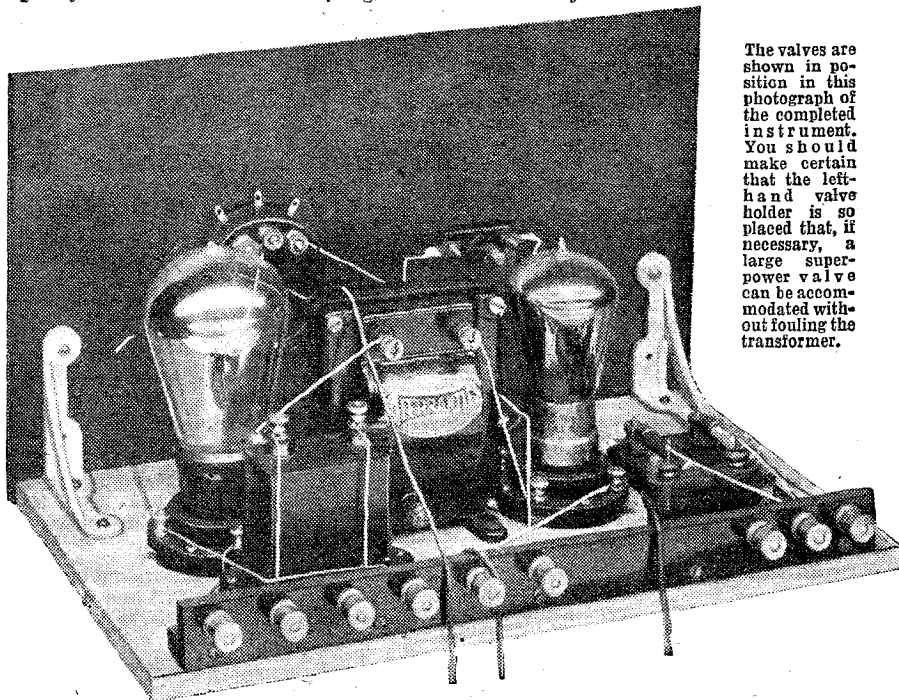
Here is the first of three special back-of-panel photographs which accompany the full description of the Two-Valve Amplifier. These, together with the 6d. Blueprint which is given free with this issue, and the point-to-point check list on this page, should make the work of assembly a very straightforward and simple task.

A TWO-VALVE L.F. AMPLIFIER.

(Continued from previous page.)

circuit is a combination of resistance-capacity and transformer coupling, and

a screwdriver, drill, and a pair of cutting pliers will be the only real essentials. A soldering iron can be used on the joints, but even this can be dispensed with, because terminals are also provided, and the electrical connection obtained if the wire is bent round and screwed down tightly beneath the terminal head is perfectly satisfactory.



The valves are shown in position in this photograph of the completed instrument. You should make certain that the left-hand valve holder is so placed that, if necessary, a large super-power valve can be accommodated without fouling the transformer.

without a doubt this arrangement is the best for all-round results.

The two essential components in the circuit are therefore a resistance-capacity-coupling unit and an L.F. transformer. There are now a number of really good R.C.C. units on the market, and the reader will have no difficulty in making his choice. Any unit of reputable make will work quite satisfactorily.

With regard to the transformer I would choose one having a ratio of between 2.5 and 4 to 1. The lower ratio will probably give slightly better reproduction, but the higher ratio will enable greater volume to be obtained. Perhaps the best scheme is to compromise and to employ a transformer having a ratio of about 3 to 1. In any case, you won't go far wrong if you purchase a

A 6d. Blueprint of this Two-Valve Amplifier is one of the four presented free with this issue of "P.W."

good make of instrument. If you examine the blueprint you will notice that a 500,000-ohm potentiometer is connected between the two secondary terminals of the transformer. This is to enable you to adjust the volume to the required strength. If the signals are too loud you can cut them down a little.

This is a most valuable feature, because it enables you to avoid those irritating little rattles and "dithers" which denote overloading, and so tend to reduce the pleasure of listening to a first-class broadcast programme.

The constructional work is straightforward and few tools are required. In fact,

So you see that if you haven't tackled a job of this description before, there is no necessity for alarm. It is only a question of following the blueprint lay-out and wiring,

in conjunction with the photographs of the actual amplifier, and you can't go wrong.

Take, for instance, the R.C.C. unit. This will have four terminals marked H.T. +, P, G, and - (or in some cases G.B.). Connect the H.T. + terminal to the "Input" terminal on the ebonite strip, and P to the "A₂ Input" terminal. G will go to the grid socket of the first valve-holder, and - to G.B. -1. If you then join up the filament circuits and the transformer connections the wiring is very nearly completed.

To drill the hole for the potentiometer (volume control) and "on-off" switch you will need a $\frac{3}{8}$ -in. twist drill, and for the terminals, if these have 2 B.A. shanks, a $\frac{5}{16}$ -in. drill will suffice.

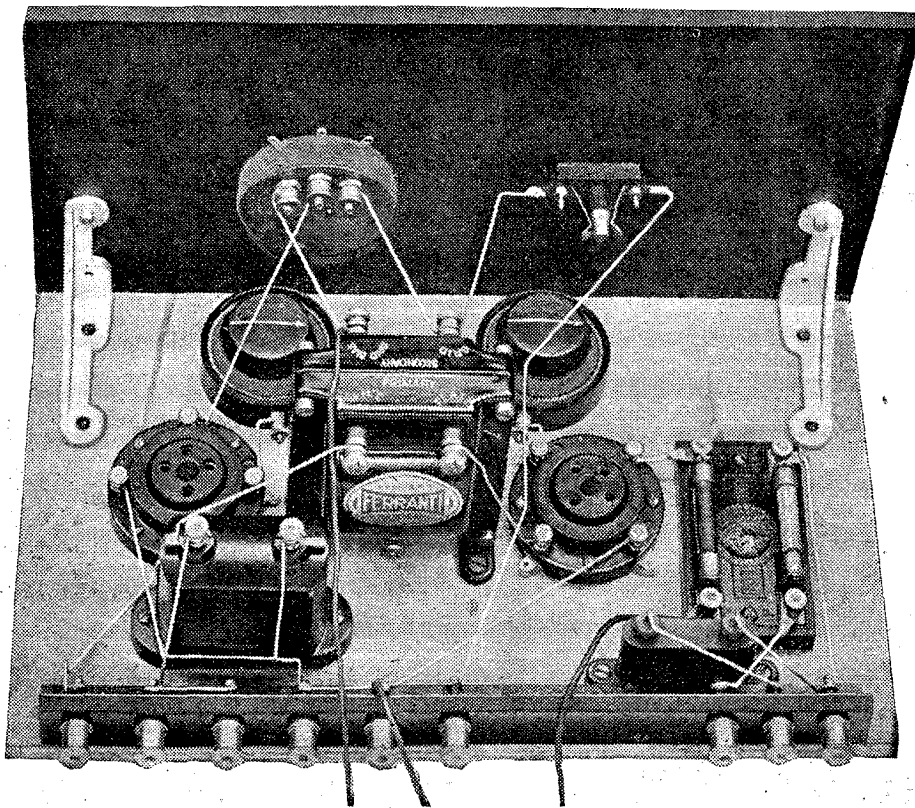
Wiring Up.

You can buy a $\frac{3}{8}$ -in. drill for about one shilling, and a complete set of smaller drills, ranging from $\frac{1}{16}$ in. to $\frac{3}{16}$ in., for two shillings.

It doesn't much matter about using insulated wire throughout, but you will be well advised if you use some form of insulation covering for the L.T. and H.T. leads, because if two of these wires happen to touch, and they are not insulated, you may burn your valves out or damage your L.T. battery. Keep all the wires nicely spaced, and where you use terminal connections grip the end of the lead tightly beneath the terminal head, otherwise the joint may move slightly and cause crackling noises in the loud speaker. If you use Glazite or a similar type of insulated wire an old safety razor blade renders the removal of the covering an easy task.

Having completed the constructional work you will want to know how to adjust

(Continued on page 1124.)



Practically every lead and every component can be seen in this photograph. The filament rheostats are mounted on the baseboard just behind the valve-holders. The potentiometer mounted on the panel operates as an efficient volume control. The three grid bias leads are in the foreground.

"Sixpence in six months"

"EKCO"

H.T. UNITS

pay for themselves over and over again

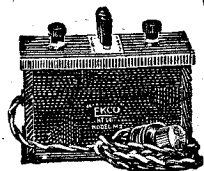
Do you realise that if you use your set as much as six hours a day an "EKCO" D.C. Model selling at **17/6** complete will cost you only **6d.** in 6 months, and that an "EKCO" A.C. Model selling at **£4 : 12 : 6** complete with Valve and Royalty will cost you only **2/6** in 6 months.

Remember, too,

the life of an "EKCO" is many years!

Compare these figures with your battery costs and you will never buy a battery again!

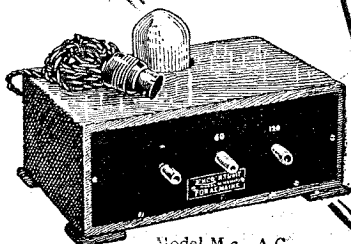
Model	Voltage Tappings	Sets Suitable for	D.C. Price		A.C.*	
			£	s. d.	£	s. d.
M.1.	60 or 90 or 120	1 to 3-valve sets only	0	17 6	3	7 6
M.2.	60 and "Power"		1	9 6	6	2 6
1.F.	60, 120, and "Power"		2	12 6	6	15 0
2.F.	60, 90, 120, and "Power"	Majority of sets of not more than 5 or 6 valves	3	5 0	7	7 6
3.F.	60, 90, 120, and "Power"		3	17 6	7	12 6
1.V.	0-100 variable } and 120 fixed } "Power"		4	2 6	8	17 6
2.V.	0-100 variable } and 0-120 variable } "Power"	(A) Multi-Valve (B) Super-Het (C) Sets depending on a critical voltage adjustment	5	7 6	9	10 0
3.V.	0-100 variable } and 0-120 variable } "Power"	(D) Fada, Burndept, Elstree Six, etc.	6	0 0		
C.2.	100-150 var.	COMBINED H.T., L.T., G.B. UNIT FOR D.C. Provides: (a) H.T. 60, 120, and "Power." (b) E.T. Current for 3, 4, or 5 1 amp. valves or for any combination of valves of the same filament voltage, provided the sum total of current consumed by the filaments is not less than 3 amp. and not more than 3 amp. (c) G.B. Tappings at 1, 2, 3, 4, 6, 9 ... Complete.	The wonder unit of 1928.			
			£6 7s. 6d.			



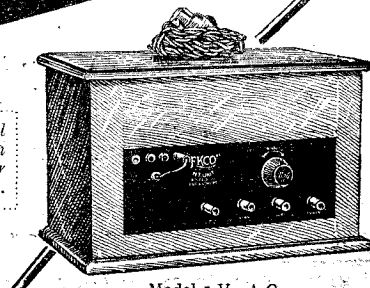
Model M.2., D.C.



Model M.1., D.C.



Model M.2., A.C.



Model 1 V., A.C.

SAFE! SILENT! SOUND!

E.K. COLE LTD

Dept. A., "EKCO" WORKS,
LONDON RD., LEIGH-ON-SEA

Write for illustrated folder! There is an "EKCO" model for every purse and voltage.

The Recipe for GOOD RADIO

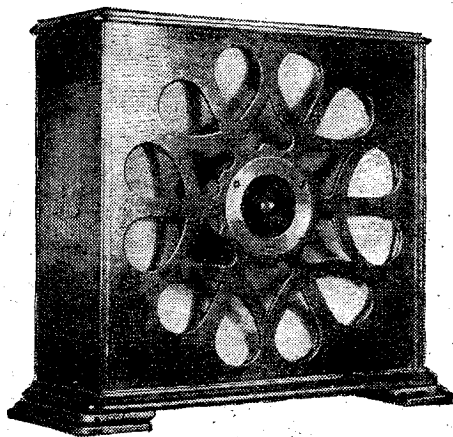
MOST modern receivers are capable of giving good quality reproduction provided they are given a fair chance.

Take a good aerial-earth system. Use little, if any, reaction. Fit the correct valves with a "power" or "super power" type in the last stage.

Provide ample H.T. and a source of supply which will stand up to the load. Add the correct grid bias and there remains but one thing necessary for really good radio.

And that, of course, is an

AMPLION Loud Speaker

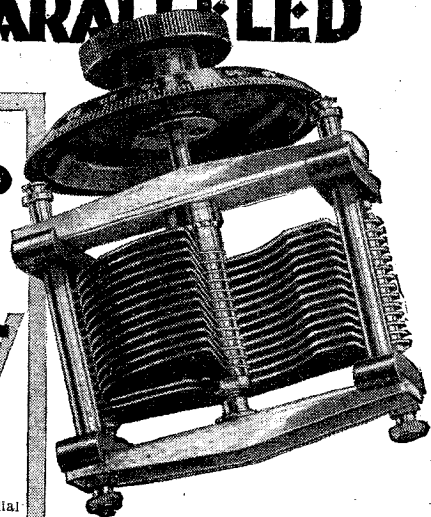


AMPLION CONE: the popular Junior Cabinet Model in Oak at £4 or Mahogany at £4/4/0

25 models from 37/6

Announcement of Graham Amplion Limited, 25, Savile Row, London, W.1.

REDUCED PRICES MAKE THIS VALUE UNPARALLELED



Last year we concentrated our resources and experience to the production of a first-class precision condenser at a popular price.

Few wireless constructors have not heard of the wonderful success that followed its introduction. The experts described it as a condenser worth at least double its price. Constructors from all parts of the country have expressed their astonishment at finding such efficiency at so low a price.

Now this value is to be even greater. Our new factory, equipped for a far greater output, is able to produce these "Popular" Condensers still more inexpensively. We pass these economies in full to public.

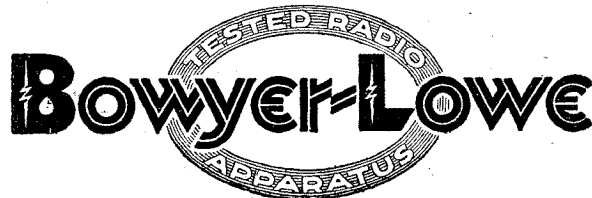
Every good dealer stocks Bowyer-Lowe quality components.

We shall be happy to send you our catalogues on request and to tell you where you can obtain our components in your district.

DETAILS:

End plates are aluminium pressings. Rotor mounted on ball bearings. No "sloppy" bearings, springs or spring washers.

Straight line wave length curve. Girder construction for strength. Perfect balance and dead accurate adjustment.



Popular Condenser

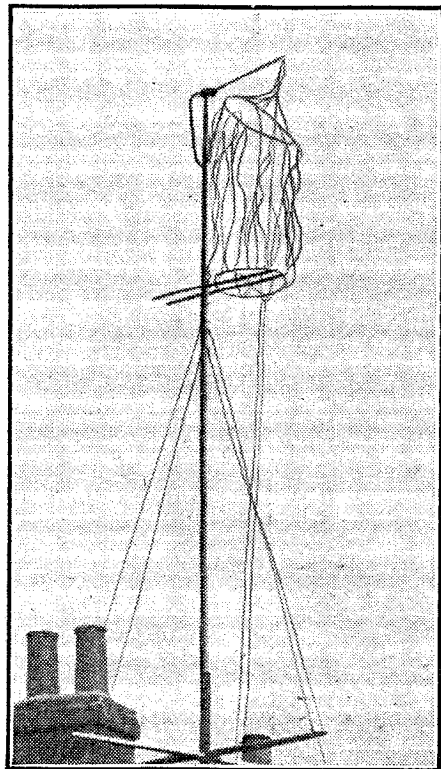
BOWYER-LOWE CO., LTD., LETCHWORTH

THE development of the aerial through years of experimental wireless may, in a large measure, be regarded as indicating the trend of the development of the science itself. Many of our readers may recollect, with amusement, the lengthy affairs which were regarded as necessary in pre-broadcasting days, when a sea-going operator would have wept at the thought of being assigned to a ship where anything less than a 350-ft. length was considered adequate.

In this more enlightened period, of course, we perforce confine ourselves to a hundred feet of aerial, exhaustive experiment having shown that, on the whole, this allows us quite sufficient for ordinary reception purposes.

An Enterprising Builder.

But it is safe to say that quite forty per cent of the aerials which now adorn (or disfigure) our gardens and backyards, are indicative of the spirit of independence and inquiry which characterises the amateur of to-day. These departures from aerial orthodoxy usually owe their inception to the fact that "Necessity is the mother of invention," and are interesting not only from the standpoint of novelty but also because they illustrate individual attempts to solve



An amateur's "cage" aerial, which, although rather untidy looking, gave good results. The wire is passed backwards and forwards between ordinary hoops.



How you can make the most of small spaces for your antennas.

By A. J. BOYINGTON.

aerial problems which must be a source of perplexity to thousands of other amateurs.

For instance, there was a builder whose yard, as frequently happens in the building trade, housed an accumulation of timber, chimney-pots, slates, glazed bricks, piping, ironmongery—all the impedimenta of his calling. This left him without the room to erect even a double 30-ft. aerial.

For the first ten feet or so of the aerial mast, lead-in tubes were "staggered" in a spiral and the wire (an insulated one) connected from one to another of these tubes. The wire was then arranged in "gridiron" fashion, each loop being anchored to the mast by a small staple.

And results? Well, he worked a small "Amplion" at full volume from the Nottingham relay station, ten miles away, through an ordinary straight reaction-and-amplifier two-valve set.

Then an amateur strangely enough, obtained greatly improved reception simply from his consideration for a neighbour's pigeons! Thinking that the birds in their flight might not notice the slender wires and, possibly, get entangled therein, he varied the usual expedient of fitting corks to the wire, and utilised, instead, some short lengths of 7/22's he had remaining from his aerial installation.

The "Gooseberry Bush."

These odd bits he untwisted and affixed, star-wise, between the strands of the wires in order to make them more prominent, and was agreeably surprised to discover that his commendable solicitude for the pigeons' welfare had resulted in 50 per cent improved reception.

I have seen only one example of another type I have in mind.

At first glance it appeared something like a leafless gooseberry bush surmounting a short mast attached to one of the chimney-stacks of the house. Closer inspection proved it to be a bunch of 10-ft. lengths of 7/22's wire, splayed in all directions, and with the free end of each separate length untwisted for an inch or two and spread out star-wise.

The "bush" was confined to the mast by a brass collar, from which the lead-in was taken, while between the

wires and the mast necessary insulation was provided by a thick rubber band extending about an inch higher and lower than the brass collar.

In this instance, the ordinary type of aerial was an impossibility, owing to lack of space, but I very much doubt whether it would have afforded such reception as did the quaint improvisation. There were between 30 and 40 separate lengths of wire in the arrangement, so that the ingenious amateur had something like 400 feet of aerial all told.

It was absolutely non-directional, a wonderful collector of energy, and appeared to give exceptional "DX" results on a single-valve receiver.

Simple and Compact.

Its great recommendation, of course, was the fact that it occupied very little space and was reasonably simple of construction. For that reason it should recommend itself to many of my readers.

Many problems arise in the erection of a suitable antenna, and the examples noted are typical instances of difficulties overcome by a departure from stereotyped methods.



A commercial version of the "cage" type of aerial, which looks quite neat and gives very good results.

COMPARATIVELY few experimenters realise the number of useful duties that the humble little flashlamp may be made to perform in the wireless set. A few of them will be described in the present article, but these by no means exhaust the list of possibilities. They will, however, probably suffice to show the reader that the flashlamp is worthy of more attention from the wireless man than he has hitherto paid to it.

Flashlamp Protectors.

There are probably few wireless enthusiasts who have not at one time or another burnt out expensive valves, either by making wrong connections in those moments of temporary insanity to which all of us are liable, or as a result of inadvertently making a short-circuit between H.T. + and L.T. — with a screwdriver, or some other tool whilst carrying out some small adjustment without having troubled to switch off the batteries. Damage to valve filaments by excessive currents can be insured against, so to speak, by using flashlamps as protectors in the way shown in the larger diagram. Some experimenters use only one lamp, in the H.T. negative lead, as shown at A in the diagram. This is all very well where there is but a single H.T. positive lead, but where there are two or three it must be remembered that a portion of the H.T. battery may easily be shorted.

Forty Different Types.

It is much better, therefore, to place a flashlamp not only in the negative lead, but also in each of those running to the positive busbars. When this is done, provided that suitable flashlamps are used, both the valves and the battery are effectively protected. It is most important to safeguard the H.T. battery from big overloads.

To most people one flashlamp is very like another; they are, in fact, bought with as little discrimination as a box of matches or a packet of pins. It will come as a surprise to many to know that there are nearly forty types, with different filament resistances and load capacities made for voltages between 1.25 and 4. A full range of them will be found in the catalogue of any shop which deals extensively in electrical supplies, such as The Grafton Electric Company.

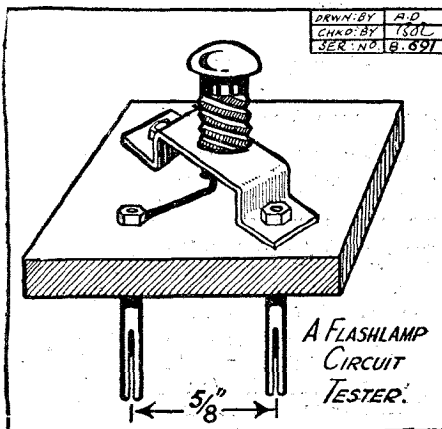
Clearly, what we want to protect dull-emitter valves and H.T. batteries from the effects of wrong connections or short circuits is a lamp which burns out under a very small load. A lamp which I have found most satisfactory for this purpose is one rated to consume .3 ampere at 1.25 volts. Actual tests show that these burn out instantly when the load exceeds .4 ampere. So effective are they as protectors that I have on several occasions demonstrated their qualities to friends by

SAFEGUARDING YOUR SET.

Flashlamps, or pealamps as they are sometimes called, cost only a few pence each, but they can save you causing, by accident, real damage to your set or its accessories.

By R. W. HALLOWS.

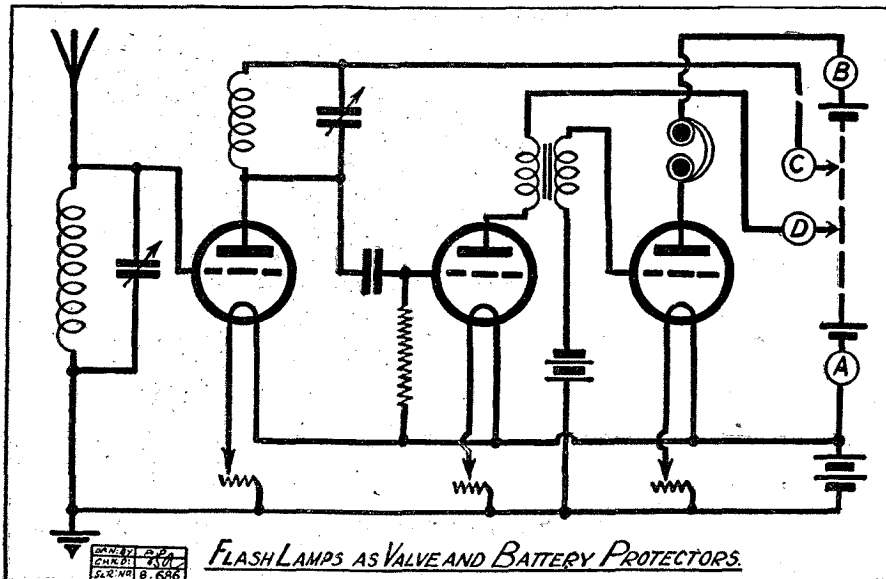
wiring up three P.M.4 valves with one of them in series, and then deliberately making connections to the extreme ends of a 100-volt battery. The lamp flashes at once, and the valves are uninjured. It should be remembered that the filament of the average dull-emitter valve will not be actually burnt out if a current as high as



about .7 ampere is passed through it for a brief instant. Old valves of the thoriated-filament type may actually be improved by such treatment! A flashlamp of the kind recommended may be regarded as ample protection for two or three dull-emitters of the low-consumption kind, or for a single valve of the .25 ampere class.

An Inspection Lamp.

A very useful addition to the receiving set is an inspection lamp mounted on the baseboard in some convenient position and controlled by a switch on the panel.



Whenever anything goes wrong with the receiving set, or when some slight adjustment of its inward parts has to be made, the lamp is switched on and you have plenty of light to work by. A lamp of this kind makes it very easy to see whether dust has collected between the vanes of variable condensers, as well as facilitating many little jobs which, if undertaken during the evening, might in the ordinary way necessitate disconnecting the set and moving it out from the corner in which it usually lives.

Useful Panel Fitment.

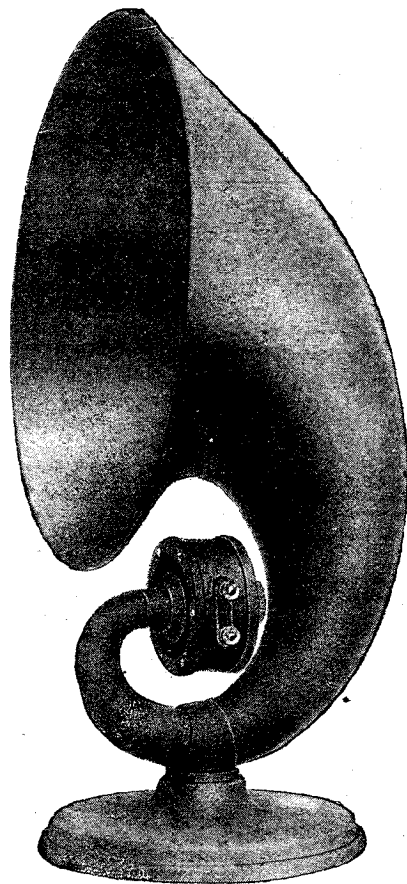
Even in the best lighted room it is not always too easy to obtain exact readings of condenser settings such as are necessary for fine tuning. The process is made infinitely easier by arranging a flashlamp on the panel immediately over the condenser dials. This again is controlled by a switch on the panel. A switch of the press-button type may be used, since the light is seldom required for more than a few seconds at a time. A neat little fitting of this kind may be purchased ready-made, complete with a shade which keeps the light out of one's eyes and throws it down on to the dials. Or a simple device can be contrived in the home workshop. The base of a batten holder is straightened out, and the holes in it are enlarged to take 4 B.A. screws. In the panel is drilled a hole large enough to allow the socket of the holder to pass. The socket is put through this from the back of the panel, and the flat part of the holder is secured by means of a couple of countersunk 4 B.A. bolts and nuts.

Simple Circuit Tester.

A shade is easily provided with the aid of a short piece of ebonite tubing with an internal diameter of about 1 in. This is cut in half lengthwise, and is secured to the front of the panel by means of the bolts which fix the lampholder in position. A notch large enough to clear the socket of the holder is cut in one edge with a round file.

A last use for the flashlamp is illustrated in the smaller diagram. A batten holder is mounted diagonally upon a small piece of 1/4-in. ebonite through which are drilled two 4 B.A. holes 3/4 in. apart from centre to centre. Through these holes are passed valve pins, one of which goes also through one of the fixing holes in the lampholder. The second pin and securing nut are kept clear of the body of the holder, but a connection is taken from it to the central insulated contact below the socket. The use of such a tester will be at once apparent. With its help you can see in a moment whether your L.T. circuits are in order without risking an expensive valve in the process. Try the tester in each in turn with both H.T. and L.T. batteries switched on.

THE FERRANTI SPEAKER



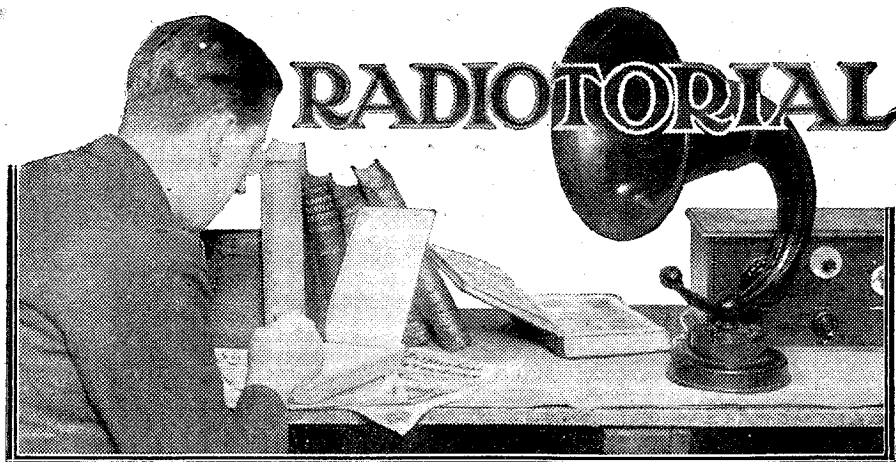
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An exceedingly good instrument, free from common resonance effects, with a very uniform response over most of the musical frequency range and quite free from subsidiary vibration effects.

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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 and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work, carried out with a view to improving the technique of wireless receivers. 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.

REPAIRING ACCUMULATORS.

"SIDDY-BOY" (North Acton, London, W.3).—"At a sale I got two 6-volt accumulators and some half-exhausted dry cells for two shillings, and as the accumulators don't look too bad I should like to try overhauling them. Where can I get a cheap book on the subject?"

A WIRING HINT.

You will find a long illustrated article on the subject of repairing accumulators in the January issue of "Modern Wireless." It contains just the information you want.

H. G. (Leighton Buzzard).—"Since reading P.W.'s hints on wiping over soldered joints with a clean rag whilst they are still hot, etc., I have been very successful with soldering. But I wonder if you can help me with the following snag? Where one is going to put a soldered joint close to another soldered joint, how can it be done without the heat for the second joint unsoldering the first one?"

Try wrapping a damp rag round the joint, to keep it as cool as possible. This generally does the trick.

HOWL AND SHRIEK!

"NANCY" (London, E.10).—"I can get London very loud, but it seems harsh all the time, and when I turn the knob it howls and shrieks like anything. What shall I do?"

Do? Why, you will "howl and shriek like anything," too, if your neighbours catch you, "Nancy"! For your set has been oscillating, and this spoils the programmes of everybody for miles round. PLEASE don't switch the set on again until you have read the reply to "Reaction," which appears below.

DON'T OSCILLATE.

"REACTION" (Southend-on-Sea).—"My set is a 'Regional Two,' built according to the description in 'P.W.' No. 286 (Nov. 26th, 1927). It goes fine on 2 L O, but not knowing much about reaction I don't try to strengthen much, because it interferes with my friend's set next door. I think I could get a lot more out of the set if I knew how to handle reaction properly. How can I tell when the set is oscillating? Should it be made to oscillate when searching for distant stations after London closes down? How far can reaction

(Continued on page 1110.)

IT is a recognised fact that first-class wireless sets must be constructed of the very best materials if perfect results are to be obtained. Perfect reception and tone depend entirely on the quality of the materials used for baseboards and panels.

CELASTOID

TRADE MARK

CELLASTINE

TRADE MARK

Wireless experts have used and tested these materials and report excellent results.

These materials have been used and tested by wireless experts, who report excellent results. Besides tending to give better reception, improved tone and high dielectric properties, these materials have absolute stability in quality. There is no discoloration with age or exposure. They can be worked with ease, no splintering or cracking when machining, tapping, drilling, etc., is experienced. They have deep, brilliant and lasting polish which does not affect surface resistibility.

CELASTOID

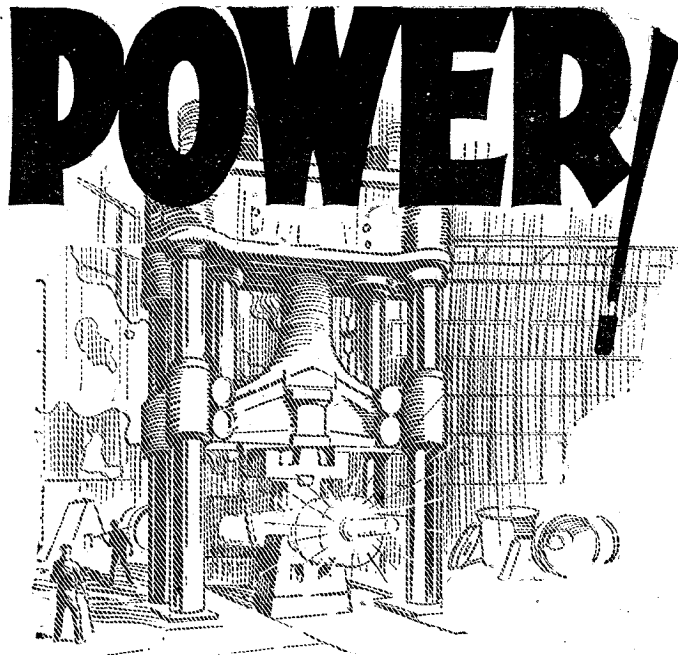
is obtainable in a realistic imitation of Tortoiseshell. It possesses the following characteristics: It is Transparent and can be supplied in both Transparent and Opaque colours. Wireless manufacturers have found numerous applications for the Fancy Patterns which include Tortoiseshell, Marble, Brocades, Moire, Nacre of Pearl.

PANELS CUT TO SIZE ARE SUPPLIED BY:—
Messrs. Rooke Bros., 55, Cardington Street, N.1.
Messrs. Roberts, Newton Street, Birmingham.
Messrs. Robert B. Clarke & Co., Eldon Street, Oxford Road, Manchester.

CELLASTINE

is obtainable in Black, Opaque and Wood colours. Cellastine is also supplied as Cellastine Moulding Powders, which possess the same unique properties as sheets and are ideal powders for moulding components where quality is the main consideration.

Sole Manufacturers: BRITISH CELANESE LTD., CELANESE HOUSE, HANOVER SQ., W.1.



THE Giant Forging Press gives an impression of immense Power. Similarly, the Siemens "Power" Battery, in appearance alone, is sufficient to inspire confidence in its ability to meet the most exacting demands of Power Valves.

If you use a Power Valve, Why not use a "Power" Battery?

READ THIS!

"The 'Power' Battery is beyond all expectations. My reception has improved and I cannot conceive anything better. I shall recommend it to all my friends."

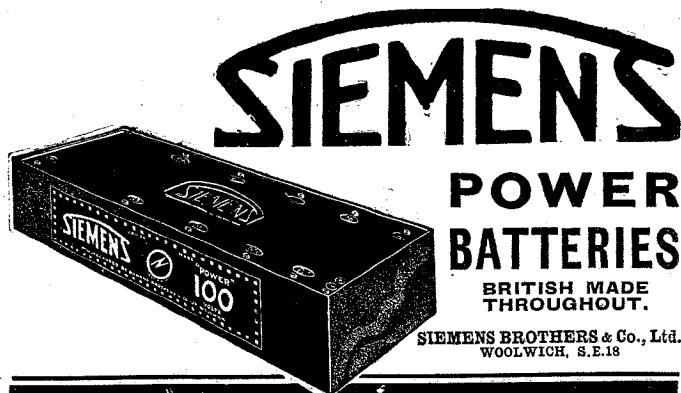
Extract from a recent letter.

A Siemens "Power" Battery will last three times as long as an ordinary battery. It will pay you to use one.

ASK FOR

SIEMENS No. 1204 Power 60 volts, **15/-**
SIEMENS No. 1206 Power 100 volts, **25/-**

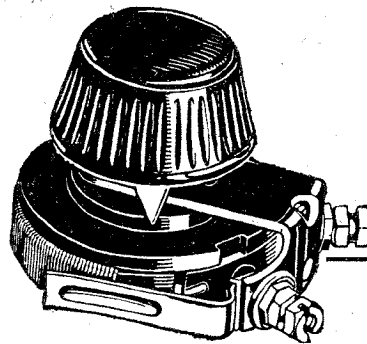
AT YOUR DEALERS.



SIEMENS
POWER
BATTERIES

BRITISH MADE
THROUGHOUT.

SIEMENS BROTHERS & Co., Ltd.
WOOLWICH, S.E.18



Actual Size

Price

2/-

The Lowest priced Quality Rheostat

The extraordinary value of the Igranitic C.H. Filament Rheostat has created an unusual stir amongst constructors. The demand exceeds all expectations but fortunately our stocks are adequate to meet all orders.

Never before has such a really high-grade rheostat been offered at such a low price.

The Igranitic C.H. Filament Rheostat

possesses every feature essential for perfect filament control. The well tried form of contact finger, with the added refinement of a domed sliding surface, provides a firm, steady contact and allows for smooth turning without chatter or noise. One-hole fixing allows for easy mounting, and the special anchor bites into the panel and prevents rotation of the frame. Terminals are conveniently placed and easily accessible from the top of the set. The resistance element, being held by a spring, cannot slip or wear out of true.

A special feature is its compactness. It is only $1\frac{3}{8}$ in. in diameter, and projects only $\frac{3}{8}$ in. behind the panel.

Made in three resistance values, 6, 15 and 30 ohms.

Price 2/- each.

Write to Dept. R74.

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



149, QUEEN VICTORIA STREET, LONDON, E.C.4.
Works: Bedford.

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MANCHESTER, NEWCASTLE-ON-TYNE

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1108.)

be used without danger? Ought I to use reaction, and is it necessary to good reception?"

The truth about reaction is this: A *little* reaction helps to get good strength. A *lot* of reaction gives strength at the expense of quality.

Too much reaction spoils your own reception and that of all your neighbours.

To prove this you can try the effect of reaction for yourself. Choose a morning when 2 L.O. is not broadcasting, turn the aerial-tuning condenser half-way or three-quarters in, and start with the reaction control "all out."

If you listen for ten minutes or so you will probably hear several more or less weak stations, probably sending the dots and dashes of the Morse code. If you can hear telephony, so much the better.

Adjust the aerial condenser so that one station which is working comes in rather weak, and then leave the aerial condenser at that setting and try the effect of reaction.

If you increase reaction, a little at a time, you will find it strengthens results. For instance, if you wet your finger, and tap the aerial terminal with it, you will hear a click every time you tap. With reaction "all out" the clicks will be weak. But when you put a little reaction in the clicks get louder.

Similarly, signals which can hardly be heard without reaction will be quite clear when a little is used—but there is a limit to this process, and the limit is known as the oscillation-point.

Trying the wet-finger test, you will find that as reaction is increased the clicks get louder and louder, till suddenly there is a sort of "plop" or click or thud in the phones, and a steady rushing noise can be heard. The clicks from the wet finger become very loud, and these symptoms—the very loud clicks and the rushing noise—indicate that the oscillation-point has been passed, and the set is now causing interference with others. You will notice that signals from any station previously heard are spoiled when your set oscillates—telephony is distorted, and the clear notes of Morse stations become blurred and harsh.

Very often you hear not only a rushing sound, but a whistle as well, and if you alter the tuning condenser this whistle goes up or down. This is certain proof that you are oscillating and you should immediately slack off reaction until it reaches a point where the symptoms disappear.

Never use more reaction than you can help. For the local station a set should really not need any if it has sufficient valves. But a little may be used without doing any harm to anybody, provided that the set is always kept well below the oscillation-point.

The chief trouble with interference comes from sets which are tuned and adjusted whilst too much reaction is being used on them. Reaction should always be kept low, except when the very highest sensitivity is required to pick up a distant station. Even then

there is no need to oscillate, but as there is a risk of slipping into oscillation without meaning to, the set should not be used for long-distance listening whilst the local station is broadcasting.

WAVE-LENGTH LOWERED BY COIL AND CONDENSER.

R. S. (Stanford, Middlesex).—"The anode coil will be a sixty-turn (basket type), and I am wondering what range it should cover if tuned by a '0003 across it."

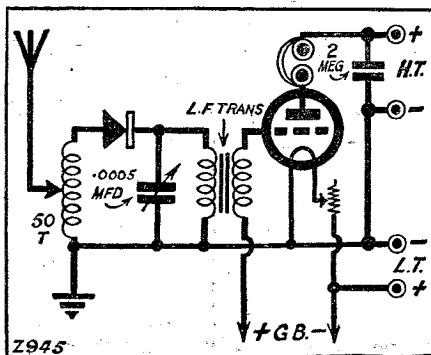
It will tune from about 200 metres to about 500 metres, when shunted by the '0003 variable condenser.

ENOUGH TO MAKE AN AUNT LAUGH!

B. A. B. (Bury St. Edmunds).—"You may not believe it, but these are the exact circumstances. My uncle and I were both sitting together at 11.5 p.m., each of us wearing a pair of telephones. He had been telling me that two nights before the set seemed to go on and off in a very mysterious fashion, but we had been congratulating ourselves that that evening the programme was exceptionally good, clear, strong, and, what is more, well worth listening to. He had the evening paper on his lap, and presently, while we were talking, it fell to the floor. We did not take any notice of that for a moment, but presently uncle bent down to pick it up. As he laid his hands upon the paper *all music suddenly ceased*. In his surprise he let the paper lay upon the floor and sat upright, when the music immediately recommenced! We looked at one another, wondering if we had heard correctly, and after a few moments' conversation about it my uncle stooped down to pick up the paper, again. To our intense surprise the moment he laid his fingers upon it all the signals stopped again. Yet when he resumed his seat they immediately started once more. (At this point again it was at full strength.) It may not seem

(Continued on page 1112.)

WHAT IS WRONG?



The above diagram is supposed to represent the connections of a Crystal Detector, with L.F. Amplifier. But it is wrong, and the set would not work properly.

Next week the correct diagram will be given, and, to test your skill, we shall continue to publish every week a diagram in which a mistake (or mistakes) has been inserted. The correction will be published the following week.

No prizes are offered, but by following this series and trying to solve the problems, week by week, the reader cannot fail to learn a lot about radio circuits.

RADIO SOCIETY OF GREAT BRITAIN

DR. RICHARD H. REECE, M.A.
EXPERIMENTAL RADIO STATION
G.2MS

THE CORNER HOUSE,
62 ADDISON GARDENS,
LONDON, W.14
ENGLAND

5th January, 1928.

Dear Sirs,

For some 15 years I have carried out serious wireless experimental work both receiving and transmitting, and during the last 10 months I have devoted much time and money to "quality" reception, involving the use of high anode voltages. One of my greatest bugbears has been the failure of anode resistances and grid leaks or all makes.

I have now fitted the Carborundum resistances with which you so kindly supplied me to my high-powered amplifier, and to my surprise they have stood up to all the harsh treatment they get in this position, and are moreover perfectly silent.

This both interested and pleased me, so I tried to "kill" a 150,000 ohm anode resistance. 550 volts were applied directly across the terminals for several hours without damaging the resistance. The voltage was then increased to 850 and over 100 R.amps were passing. Such drastic treatment burnt off the paper label, but quite failed to injure the carborundum or loosen the caps, and the resistance was normal when tested for rated value, and still perfectly silent when used in a set.

You may use this letter if you wish, as I consider Carborundum to be a real "find".

Yours faithfully,
Richard H. Reece
G.R.M.S.

Messrs. The Carborundum Co. Ltd.
Trafford Park
Manchester

**THIS
DRASTIC TREATMENT
OF CARBORUNDUM RESISTANCES
BY DR. REECE,
THE LEADING EXPERIMENTAL.**

proves conclusively the indisputable superiority of CARBORUNDUM over other materials.

The Resistances used in the above extraordinary tests are exactly similar to those incorporated in the Carborundum R.C.C. Unit which is now recognised by leading authorities to be the most satisfactory form of R.C. Coupling.

Carborundum Resistance Capacity Coupling Unit	Price each 8/6
Carborundum Anode Resistances, and Grid Leaks	2/6
Carborundum Stabilising Detector Unit—the most satisfactory method of crystal detection	12/6
Dry Cell, extra 5d.	

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DARIO MICRO SPECIAL . 4 volt '05 amp.
DARIO MICRO BIVOLT . 2 volt '05 amp.

GENERAL PURPOSE VALVES

The 2 Dario Micro Valves are the most popular General Purpose valves ever realised; they have a rather high impedance of 20-22,000 ohms, and a co-efficient of amplification of about 12. They give very good results as H.F. amplifiers and first L.F., and as detectors they have never been equalled. We have recently experimented on short-wave reception with these valves and have obtained on a single valve marvellous results, especially for Australia (Sydney) and America.

The main advantages of the Dario Micro, 2 and 4-volt valves, are as follows:

- 1st. They consume only '05 amps; the figure is guaranteed and has been verified by many experts.
- 2nd. The filament works at a very low temperature, which ensures a very long life of the valve.
- 3rd. They are extremely sensitive, the faintest signals being detected and amplified without difficulty.
- 4th. The electrodes and filament being supported by rigid rods and solid frames, the perfect rigidity of the system is ensured and no microphonic effect takes place.
- 5th. The outside appearance of the tube is perfect, the glass is faultless, the cap is made of the best insulating material and milled all round to ensure easy finger grip to withdraw the valve from the holder.
- 6th. The pins are split and nickel-plated, which ensures good and permanent contact.

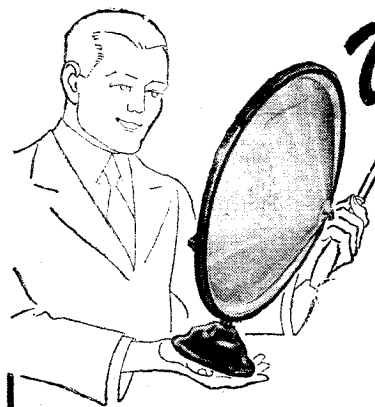
EFFICIENCY, ECONOMY and SMARTNESS are the three qualities which will decide you to choose DARIO MICRO VALVES.

A LIST OF DARIO VALVES			
2 VOLT.		4 VOLT.	
DARIO MICRO BIVOLT '05 General Purpose, 7/6		DARIO MICRO SPECIAL '05 General Purpose, 7/6	
DARIO POWER BIVOLT '18 Loud Speaker Valve, 10/9		DARIO SUPER POWER '1 Loud Speaker Valve, 10/9	
DARIO RESISTRON BIVOLT '06 R.C.C. Coupling 7/6		DARIO RESISTRON '07 R.C.C. Coupling, 7/6	

Made in France

Ask your usual dealer for particulars and literature—or apply to:—

IMPEX ELECTRICAL LTD.,
 538, High Rd., Leytonstone, London, E.11



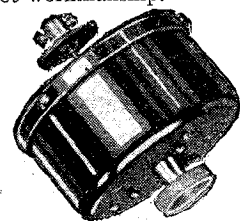
Worth £5.50
costs only
27/6
to build
 STAND 6'6 EXTRA

Goodman's Loudspeaker Components have stood the test of time. That thousands have found it an easy matter to construct a Loudspeaker capable of wonderfully faithful reproduction, for an exceptionally low cost, is proved by the large number of unsolicited testimonials received. The Goodman Seamless Moulded Cone has established itself as the finest Diaphragm at present obtainable. Our Double-Acting Reed Unit (27/6) is undoubtedly the most sensitive and powerful Unit on the market. The Goodman JUNIOR, a Unit of exceptionally good design, although only recently introduced, is now acknowledged to be far superior to any Unit at near its modest price (14/6); in fact, second only to our Double-Acting Reed type. It is housed in a strong brass case, finished bronze by electrolysis, every part interchangeable, with six screws provided at back, for fitting either to GOODMAN'S Backstays and Frames, or to those made by the constructor. Adjustable by heavily-plated knob at back. Cone bushes and strong leads (for set connections) are supplied with each Unit. Noteworthy features are the specially designed pole piece and bridge, built up from quantities of laminations—not solid. Three heavy magnets are incorporated in each unit. The ample proportions of all parts render this Unit capable of handling considerable volume without overloading or distortion. Its general appearance and finish is equal to that of the most expensive instruments. It is much cheaper to build your own Speaker, with Goodman's parts. It will give you results equal to any on the market, irrespective of price, and will astonish you in its fidelity of reproduction. Avoid imitations. GOODMAN'S were the pioneers of Specialities for Home Constructed Loudspeakers. Experience counts!

SEAMLESS MOULDED CONES ARE BEST WITH ANY UNIT.
ANY CONE IS BETTER FITTED WITH A GOODMAN UNIT.

If you are interested in COIL-DRIVEN SPEAKERS, see our Lists (C.D.5) of COIL SPEAKER UNITS, etc. Quality and finish are of the usual high GOODMAN standard, and prices as low as possible, consistent with perfect workmanship.

**EASY
 TERMS
 CAN BE
 ARRANGED
 IF
 DESIRED**



The Goodman Junior. A Reed Unit specially designed for the sole purpose of driving large diaphragms of the Cone, Pleated Disc, or similar type. NOT a converted Earpiece or Gramophone attachment.

**EASY
 TERMS
 CAN BE
 ARRANGED
 IF
 DESIRED**

Illustrated descriptive leaflets on request.

Original unsolicited testimonials at our office:

From CIRENCESTER: "Accept my congratulations on having produced the perfect Cone Speaker, and that at a reasonable price."

From BRADFORD: "I am very satisfied with the Speaker, it is the best I've ever heard for tone."

From LIVERPOOL: "The GOODMAN UNIT handles volume equal to a Moving Coil Speaker without overloading. Startlingly efficient, and all you claim as far as volume, purity, and mechanical perfection is concerned."

From CARDIFF: "I must write and tell you how pleased I am with the instrument (27/6 Unit and Seamless Cone). The tone is excellent and superior to most and equal to any other, irrespective of price. I am surprised at the splendid volume, and in this respect it is equal to a large and sensitive horn loud-speaker I have."

From GOOLE: "No praise can be too high. . . . I was positively astounded . . . the roundness and fullness of tone, mellow yet crisp speech, and the drums are all there; provided the set delivers them. . . . This is quite unsolicited praise."

If you have any difficulty in obtaining locally, send direct to us, enclosing your dealer's name and address.

GOODMANS, 27, Farringdon St., E.C.4.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1110.)

possible, but it is a fact that every time he stooped down and laid his fingers upon the paper he stopped the programme, but the moment he let the paper alone and sat up again the programme went on as merrily as ever! We brought in my aunt, and although she has no time for wireless in the ordinary way, she laughed like anything when she saw the way in which my uncle could stop the programme. I do not suppose you can hardly believe all this, but it just proves to me how mysterious wireless is, and how little mankind knows about this wonderful invention."

We believe it all right B. A. B., and on more than one occasion we have had a faulty pair of telephone leads play this trick on us!

For that is the simple explanation of the "mystery." By listening carefully while movements are being made you should be able to trace which of those pairs of telephone leads is faulty, and when these are replaced by a good pair of leads, your uncle will find that all the touching of the paper in the world will not "stop the programme" (not even if the paper on the floor is a "P.W.")

Technical Editor's Note:—We quite agree with B. A. B. about the wonder and mystery of wireless. The fact that there is a simple explanation in this particular instance does not detract from the mighty miracle of man's mastery over the ether, and although the "P.W." technical staff must have solved millions of similar "mysteries" in their time, there is no place on earth where the fundamental fascination and mystery of wireless are more keenly felt than in the offices of this journal.

AVOIDING HAND CAPACITY.

J. W. L. (Dunedin).—"When I use the tuning condenser in the aerial circuit I find it absolutely necessary to earth the moving vanes in order to reduce hand-capacity

effects. Now I am going to use it in a tuned-anode circuit where neither side of the condenser is earthed, so that what I want to know is should the moving plates now go to the plate of the valve or should they go to H.T. positive side?"

From a high-frequency point of view that side of the tuned-anode circuit which is farthest from the plate of the valve is directly earthed through the H.T. battery or by-pass condensers; so that in order to obtain the same screening effects from hand capacity you should connect the fixed plates of your

"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 offer an unrivalled service.

Full details, including a revised scale of charges, can be obtained direct from the Technical Query Dept., "Popular Wireless," 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.

variable condenser to the plate of the valve and the moving vanes to H.T. positive.

SCREENED VALVES ON SHORT WAVES.

"Can the newly invented screened valve be used for short-wave work, and, if so, where can I get a description of such a set?"

The new type of screened valve has been successfully used for short-wave reception, and very recently a receiver on these lines was tested in the "P.W." laboratory. A description of this system and constructional details for making the set will no doubt appear in the course of a short time.

SAFEGUARDING THE VALVE.

"Noticing that one of the screws on the variable condenser was a bit loose, I put a screwdriver carefully down inside the set and tightened it up. I had made quite a satisfactory job of this when, just as I was pulling out the screwdriver, there was a sudden flash, the valve lit up very bright, and then went out! And never since then have I been able to get anything in the way of broadcasting. What have I done?"

You ask what have you done? The answer is that you have demonstrated once more the old, old truth that it is never wise to alter the wiring or interfere with the interior of any wireless set unless you remove the H.T. negative plug from the battery. Time and time again we have warned our readers of the danger of allowing the H.T. voltage to reach the filament. A metal screwdriver, a lead out of place, a terminal dropped inside the set, a short piece of wire straggling, the tags of the telephones touching against the internal wiring—any one of these or similar instances will provide the necessary metal path, and allow the H.T. positive voltage to come into contact with the filament wiring. If this happens the valve, instead of getting 2, 4, or 6 volts (whichever it may be rated), gets the full voltage of the H.T. battery. Whether this is only 16, 60, or 160 the result is equally disastrous, and the valve will probably burn out. The remedy is to remember Radio's Golden Rule, i.e. Before altering the wiring of the set in any way, or inserting a metal screwdriver or other similar tool into the set, remove the H.T. negative plug from the H.T. battery.

(Continued on page 1114.)

how many accumulators have you got?

ONE? TWO? OR NONE? If you have only one accumulator, we will lend you one of ours while we recharge yours to ensure a continuous service. We will collect, maintain, and deliver each alternately. If you have two accumulators we will give you the same service. If your accumulators are unserviceable we will keep you continuously supplied with ours.

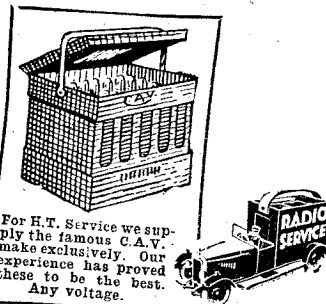
And at the same time we will loan you, if you like, the famous C.A.V. H.T. Accumulators, which experts agree give far better results for less than the cost of unreliable dry batteries.

RADIO SERVICE (LONDON) LTD., 105b, TORRIANO AVENUE, CAMDEN ROAD, N.W.5.

Telephone: North 0623-4-5.

This Service is cheaper than seeing to accumulators yourself. It saves you the trouble and risk of unskilled recharging, never leaving you without current; eliminates accumulator trouble; looks after your accumulators properly.

Our elaborate plant, skilled operators, and fleet of delivery vans guarantee an efficient, punctual, and economical service. Deliveries are made weekly, fortnightly, or monthly. Send a p.c. right away, and we will post you full particulars.



14/6

FORMO

LOW LOSS TWO RANGE COUPLER

250 to 550 and 1,500 to 2,000 metres

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

CROWN WORKS, CRICKLEWOOD, N.W.2

Phone: Hampstead 1787.

Full Catalogue free on request.

DO YOUR BELLS RING?

Nearly everyone, at some time or another, complains that their House Bells are out of order and that they are simply a nuisance. Under the old-fashioned method of Wet Cells or Dry Batteries this nuisance will never end, but if you install our **STANDARD BELL TRANSFORMER**, your bell troubles will disappear once and for all.

The upkeep is negligible and anyone who understands a Wireless installation can fit it up in a few minutes (particulars sent with each Transformer).

The **STANDARD TRANSFORMER** is worked off your lighting current, and never requires attention. It is porcelain-clad and therefore quite safe. It works on alternating current only. One Transformer will ring all your bells.

The price is 17s. 6d. post free, which please remit with your order, and state voltage of supply, or apply to your local contractor, mentioning the **STANDARD PORCELAIN-GLAD TRANSFORMER**.

S. G. LEACH & CO., LTD., 26-30, Artillery Lane, LONDON, E.1

WERE
12/6
NOW

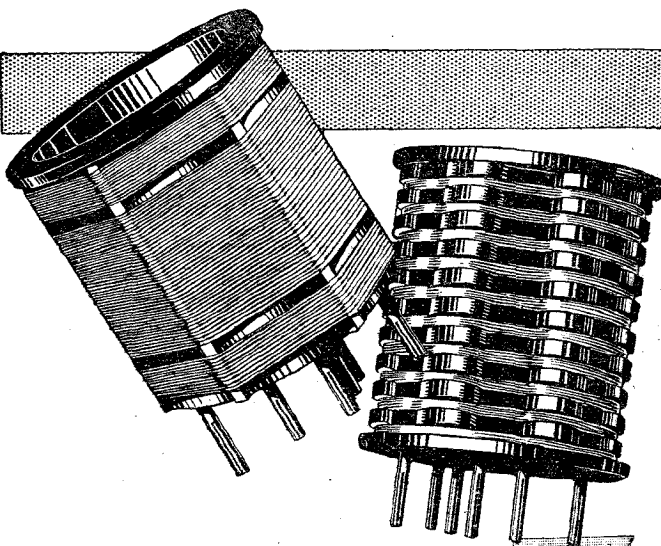


The famous Ericsson Super Sensitive Telephones are reduced to 12/6 a pair!

Adopted by the B.B.C. for use in their studios. Used by all the D.X. experimenters. Adopted as standard in 1909 by the Admiralty and in 1917 by the Air Board. Three resistances, 120, 2000 and 4000 ohms—one price, 12/6. Get your pair to-day!

Even if you have a multivalue set now and again you'll need a good crystal set. Buy an Ericsson Crystal Set to-day. Sturdily and handsomely made. A really sensitive instrument. Tunes up to 5 G.B. Will take 5 X X coil. A real snip at 15/-.
At all our agents or direct from the Company.
ERICSSON TELEPHONES LTD., 67/73, Kingsway, London, W.C.2

Ericsson
SUPER SENSITIVE
TELEPHONES.



**INSIST UPON
SPECIFIED COILS
IF YOU WANT
MAXIMUM
EFFICIENCY**

**The
Master
Three**

IF you are about to construct the Mullard Master Three Receiver you should remember that there is every reason why you should adhere to the author's specification.

SELECTIVITY to the desired degree is easily obtained with Colvern Coils. A few turns to requirement should be removed from the aerial winding and the end of the wire reconnected to Pin No.4.

RANGE depends to an extremely high degree upon efficient coils and it is very important that these should have a very low high-frequency resistance. To obtain this Colvern Coils are accurate space-wound. Experience proves that the use of Colvern Coils increases the range of a radio receiver. In the case of the Master Three Colvern Coils give maximum range.

VOLUME is similarly dependant upon the efficiency of coils. Logically, the signal strength of distant stations is greatly increased by Colvern Accurate Space-Wound Coils.

Therefore be advised—adhere strictly to the author's specification, you will be most satisfied.

Prices:—	
Broadcast Wave.	
Accurate Space-wound to give maximum efficiency.	7/6
Long Wave.	
Sectional wound to give lowest high-frequency resistance.	8/6
Colvern Aluminium Panel.	
is also specified for the Mullard Master Three Receiver 18" x 7"; 14 gauge; sprayed instrument black; drilled for variable condensers switch and panel brackets.	7/6

COLVERN

ACCURATE SPACE WOUND COILS

Colvern Ltd., Mawney's Road, Romford.

Announcement!

The famous
LOEWE High Vacuum Resistances
and
LOEWE High Vacuum Block Condensers

LOEWE RADIO



are now available in Great Britain. They have been a full success on the Continent, and will, no doubt, be equally favoured by the British public.

Please mail the Coupon below for free literature.

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Telephone:—Tottenham 2076

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Please send me your literature concerning LOEWE High Vacuum Resistances and LOEWE High Vacuum Block Condensers,

Name

Address

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BE SURE YOU VISIT THE Bargain Window. New 100-page Catalogue. Profusely illustrated. Price 1/- Post FREE, allowed off first 10/- order

SET OF THE SEASON COSSOR MELODY MAKER COMPONENTS FOR SAME Post £4.10.0 Kit. Extra

2 Ormond .0005; 2 Do. S.M. Dials; 6 T.C.C. Condensers, .001, .002, two .0003, .0001, 2 mfd.; 2 Grid Lk. Clips, B.B.; 1 Var. B.B. Rheostat; 3 Dubilier Leaks, .25, 3, 4 meg.; 3 Lotus V.H.; 1 Ferranti A.F.3; 2 Panel Switches; 1 Cossor Melody Wound Coil; Terminals, Name Tabs, Glazite, 9-v. Grid Bias (all as specified).

NOTE Drilled High-grade 21 x 7 Polished Panel, with Radion Strip, FREE with above kit.

HANDSOME AMERICAN CABINETS, hinged lid, with baseboard for 16/11 with above kit only. In mahogany 20/- All Cossor Valves stocked.

EXTRAORDINARY OFFER in 3-Valve Sets

For Local,
5 GB, 5 XX,
and
Continental
Stations.

This wonderful set, as shown, all accessories, Mullard Valves, Aerial Equipment, 100 v. Battery, L.T. 2 volts, 4-way Battery Leads, A. & E. switch, Coils for local and 5 G.B., etc. Tax Paid.

2-valve Set £5-5-0

£6-6-0

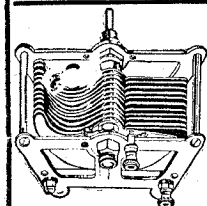
Carriage 5/- extra

"MULLARD MASTER THREE" NO SOLDER—ONLY 20 WIRES TO CONNECT. SET OF COMPONENTS

2 Strips, 1 Base, 2 J.B. Condensers, Climax Choke, 3 Valve Holders, Pair Brackets, Spade Terminals, Broadcast Coil, Bulgin Switch, R.C.C. Unit Type "A", R.L. L.F. Transformer, Mullard .0003, 2 Meg. Leak, 8 Wander Plugs, Flex.

ABOVE KIT £4-12-6

FREE with above kit, 1 Aluminium Panel, 18 x 7, drilled, and Grid Bias 9 v.
18x7 CABINET IN OAK, WITH BASEBOARD.
FOR 16/11, WITH SET OF COMPONENTS.
All Mullard Valves Stocked.



Low Loss Log-Midline

New Model
Built for Wear

.0005 9/11 .0003

Including Slow Motion Dial.

K. RAYMOND

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Come to LEICESTER SQUARE TUBE

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BE SURE IT IS
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ALL DAY SATURDAY Hours 9 a.m. to 8 p.m.
ALL DAY THURSDAY
ALL DAY EVERY DAY 9 a.m. to 9 p.m.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1112.)

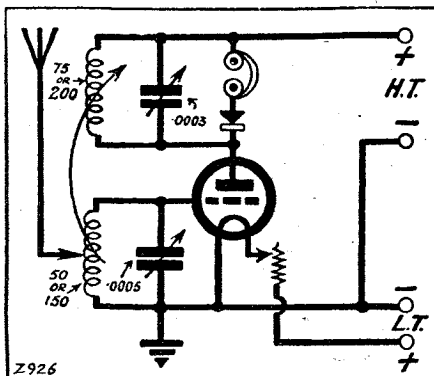
A SIN AND A SHAME!

A. B. C. (Liverpool).—"I think it is a sin and a shame the way that wireless has fell off. When I got the licence last year, Liverpool was as clear as a bell. Even if you took off the 'phones you could hear it. But now if you put on the 'phones and push both the earpieces up against the head until you can hardly hear it, it is as much as you can do to hear the news. If I knew that the broadcasting was going to get weaker and weaker as time went on I would have thought twice about buying the licence."

We are afraid that we cannot blame the B.B.C. for this, for, as a matter of fact, we think there is only one person responsible, and his initials are "A. B. C." The programmes are getting away from the Liverpool aerial all right, but it is after they have reached your own aerial that the trouble begins. In short, the trouble lies at your end of the set, and you can prove it by going very carefully over the whole set, and the aerial, earth, and 'phones.

Perhaps your aerial wire is partly broken through in one place. Or the earth wire has come away from the ground plate. Or the lead-in has become very

H.F. (TUNED ANODE) AND CRYSTAL SET



The correct connections for an H.F. and Crystal Set (Tuned Anode, with reaction) are shown above.

In the "What is Wrong?" diagram last week the 'phones were not connected in series with the crystal across the tuned-anode circuit, the coils were not for corresponding wave-lengths, the tuned-anode circuit was bypassed by a fixed condenser between filament and plate, and the aerial tuning condenser was given as .005 instead of .0005 mfd.

dirty and the contact very poor, or somewhere in the set there is a bad connection. Or the telephones have become weak.

If you have a friend who knows anything about wireless we should be inclined to ask him to look over the set for you, and he may detect the trouble at a glance. If not, let us have some more particulars on the application form of the Query Dept., so that we can form a mental picture of your set and endeavour to discover where the trouble lies. We are quite sure that when it is traced you will find that reception is brought back to all its former vigour and vim.

MOUNTING SOLENOID COIL-HOLDERS

G. T. S. (Balham, S.W.).—"As I am fond of messing about with a box of tools I am going to try my hand at making my own tuning coils, bases and all. The only snag I can see lies in the method of mounting, and I propose to fit a strip of ebonite or wood across the inside of the coil and mount legs in this for plugging the coil into its holder. Will wood do for the strip, as it is much easier to work than ebonite?"

Yes, provided the wood is thoroughly dry it is quite suitable for the purpose you have in mind.

WAVE-LENGTH OF 5 S.W.

"CURIOUS" (Ipswich).—"What is the wave-length of the new British Empire short-wave station at Chelmsford?"

The wave-length employed by 5 S.W. the Chelmsford Experimental short-wave station, is 24 metres.

JARS FOR WET BATTERIES.

E. Y. (Glasgow).—"In making up my own wet battery, do you advise me to use earthenware jars, or is glass better?"

Glass is better, as there is a certain degree of porosity with earthenware that is liable to lead to leakage troubles.

EASY CHANGE-OVER TO CRYSTAL.

G. L. A. (Gloucester).—"We have an invalid in the house (worse luck!), and my wife is afraid to detune the set because she can't get it back right. Without detuning, it is too loud on the loud speaker for sick-room nerves, so she has to do without wireless. What I want to know is, can I fix up a crystal, using the same coils for tuning, etc., with a very quick and easy change-over between that and the main set?"

"We have a pair of 'phones and I think it ought to be possible without much trouble, but I can't see a way that is both easy to fit and safe to operate. Can you suggest a good method? For if ever we wanted wireless to make us forget our troubles this is the time, believe me."

You can overcome the difficulty very easily, as follows: The idea is to use your 'phones in conjunction with a crystal detector. It will not be necessary to switch your main set on, but you can utilise its aerial tuning arrangement whilst the filaments are off, as the tuning for the crystal and 'phones arrangement.

The only new parts necessary will be a crystal detector and a pair of terminals, mount the crystal detector and the terminals near to the aerial coil on the set, and connect one side of the crystal to the top or grid end of the aerial coil holder.

The bottom or earthed end of this coil is joined to one of the newly-fitted terminals, and the only other connection necessary will be to join the remaining 'phone terminal to the remaining side of the crystal detector.

If now you examine the connections you will see that you have put a pair of 'phone terminals and a crystal detector in series across the aerial-tuning circuit, so that if a pair of 'phones is joined up, you will have, in effect, a crystal set that will operate when the main set is switched off. All that is necessary to listen in on this arrangement is to connect up the telephone tags to the new terminals.

When the "crystal" arrangement is not required simply disconnect the 'phone tags from their terminals, leaving everything else alone. It will be found that when the 'phones are thus disconnected, the main set will operate exactly as formerly, the presence of the new crystal and terminals making no difference whatever to reception. Being permanently connected they can be brought into service in a moment merely by connecting up the 'phones.

PLENTY OF STATIONS.

G. R. C. (Middlesbrough).—"How many broadcasting stations are there in all, including all those overseas?"

The total number of the world's broadcasting stations, according to a recent official publication, is 1,051.

"ALL JANGLY."

F. S. (Bradford).—"It was an old second-hand set, and at first it went as clear as a bell, but this last month or two it has gone all jangly. Now, why did it do that?"

Unfortunately there are several things that might happen after "a month or two" to cause "jangling." The likeliest thing of all is a run-down H.T. battery. Does the set need a new one, or are you still trying to run it on a battery which is really fit only for the dustbin? If so, a new battery will cure the set of its distortion; but if you have no cause to suspect the batteries we should be inclined to suspect the valves. You can get these tested by a dealer or the maker. If they prove to be O.K., too, we shall need further particulars of your set before we can suggest the cause. (See the Query Department's application form). But we expect the trouble is due to a run-down battery or else to the valves.

Back Numbers of "Popular Wireless" are obtainable from The Amalgamated Press Ltd., Back Number Dept., Bear Alley, Farringdon St., London, E.C.4. Price 4d. per copy, post free.

GIGANTIC SUCCESS OF THE REDUCED PRICES P.R. VALVES

THE FINEST VALUE EVER OFFERED



NOW ONLY

3/6

BRITISH TRIUMPH

P.R. SUPER DULL EMITTER VALVES challenge comparison with ANY OTHER VALVE ON THE MARKET. Don't imagine for one moment that they are 'tripe'—such as bankrupt stocks or rubbishy foreign valves. On the contrary, they are the latest product of one of the finest equipped factories in Great Britain. Years of experiment and research are behind every P.R. VALVE, and before leaving the Works every valve passes the most exhaustive tests. Experimenters can have every confidence in P.R. VALVES.

SELECTIVE, PURE, STRONG,

WHY PAY MORE?

When you can obtain a P.R. Valve absolutely guaranteed to stand up to every test, and sent out on the strict understanding that you get your money back without question if there is the slightest dissatisfaction.

THE WORLD'S BEST VALVE THE WORLD'S BEST VALUE

It was only by the lucky discovery of new elements and new methods of manufacture that the P.R. VALVE at 3/6 became an established fact. Hitherto, it had been sold at 8/6. The NEW PRICE BRINGS A GOOD VALVE WITHIN THE REACH OF EVERYBODY.

L.F., H.F., R.C., AND DETECTOR IN 2 & 4 VOLTS

Tell us what your circuit is. We can help you to select the right valves. Remember that R.C. Valves require at least 110 volts, and can take more with advantage. For the output of our POWER VALVES challenge comparison with any other POWER VALVES ON THE MARKET. TRY FOR YOURSELVES AND BE PLEASANTLY SURPRISED.

STUDY THESE FIGURES

Type	Fil. Vts.	Fil. Amp.	Imp. Ohms.	Amp. Fac.	M/C	
P.R.1	2	0.06	35,000	15	4	H.F.
P.R.2	2	0.06	25,000	12	4.3	Det.
P.R.3	2	0.06	18,000	8	4.4	L.F.
P.R.4	2	0.06	120,000	40	3.3	R.C.
P.R.5	2	0.15	40,000	20	5	H.F.
P.R.6	2	0.15	30,000	15	5	Det.
P.R.7	2	0.15	12,000	6	5	L.F.
P.R.8	4	0.06	23,000	15	6.5	H.F.
P.R.9	4	0.06	19,000	9.5	5	Det.
P.R.10	4	0.06	11,000	6	5.5	L.F.
P.R.11	4	0.06	120,000	40	3.3	R.C.
Power Valves	2V	0.20	6,000	5	8.2	P.
	4V	0.15	4,000	4	1.0	P.

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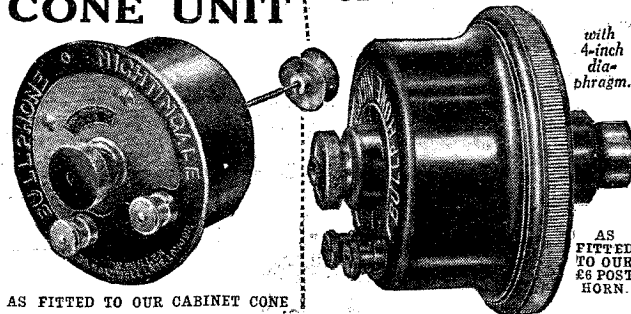
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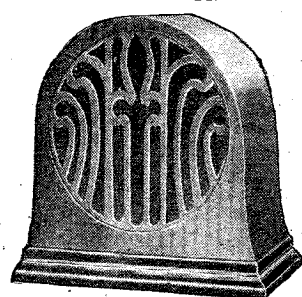
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SPEAKERS



Traders and manufacturers are invited to submit wireless sets and components to the "P.W." Technical Department for test. All tests are carried out with strict impartiality in the "P.W." testing-room, under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

EDISWAN "ONE-DER" SET.

The Ediswan "One-Der" receiver is a one-valver which apparently incorporates a detector arrangement and one stage of L.F. amplification, and the one valve carries out both of the required functions. It is, of course, a special valve, taking 2 amps. at 2 volts.

The receiver is contained in an attractive, small and neat polished cabinet, the front of which can be pulled forwards and downwards to reveal the entire "innards," and to provide access to the two plug-in coil units and the valve. This last, by the way, is much of the appearance and size of an ordinary Ediswan valve, except that it has a six-pin base. On the front wooden panel of the set are an "on-off" switch and the tuning and reaction variable condenser controls. On the left side of the cabinet are the aerial and earth terminals and on the right side

the loud-speaker terminals—note those words!

From a hole in the back of the case issues the multi-way battery cable. This is composed of six distinctively coloured flexible leads, each of which is furnished with a terminal. The set is supplied with a test certificate, which gives the dial readings obtained on a 100-ft. aerial in the case of 2 L O and 5 G B. These readings would vary with different aerials and local conditions, and a note to that effect on the report would, in our opinion, be a useful addition.

The Maker's Claims.

The task of connecting the set up is greatly facilitated by the multiple-lead. There are three H.T. connections (including the minus), and two values of grid bias have to be arranged. At least 120 volts H.T. and 6 volts grid bias are needed.

Previously we have asked the reader to note the use of the words "loud speaker," for the reason that this Ediswan "One-Der" is retailed as a loud-speaker receiver.

The makers' claims are:

"Loud-speaker reproduction of a remarkable purity—

"Ten to fifteen miles from main stations.

"Three miles from relay stations.

"Eighty miles from 5 X X (Daventry).

"Fifty miles from 5 G B (Daventry Experimental).

"These statements of range assume reasonably good operating conditions."

Additionally—a good point this—it is claimed that the set cannot re-radiate and cause interference with other listeners.

The Ediswan people's technical description of the receiver is as follows:

"It combines in itself both detector and amplifier stages. It will, therefore, work a loud speaker without the assistance of other valves.

"This result is obtained by disposing the electrodes in the valve in such a manner that use is made of what is known as the 'robbing action.' This may be explained briefly as follows: It has been found that if a flat anode and a flat grid be placed in vacuo with a filament between them and a potential applied between filament and anode (the anode being positive with respect to the filament) any voltage variations applied to the grid will affect the current flowing between anode and filament in a manner similar to what would happen if the grid were placed between the anode and filament, as is always done in the case of any ordinary three-electrode valve.

"The B.S.220 Duplex valve operates as an ordinary three-electrode valve on both sides of a common filament, in addition to which the 'robbing action' above explained is made use of to build up the signal variations.

"A study of its construction will show how this is achieved. Starting from the centre we have a rod which is the first anode, surrounded by a grid with a filament next to the grid, but separated from the anode by the grid. This is a simple three-electrode

(Continued on page 1118.)

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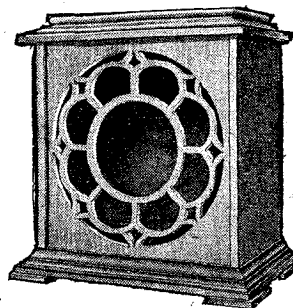
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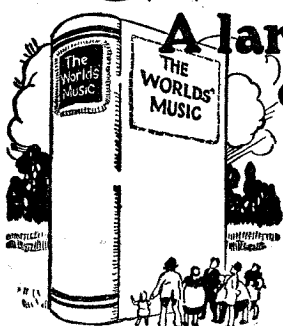
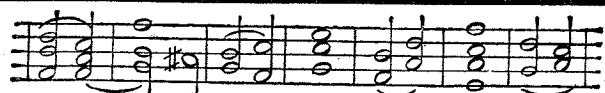
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APPARATUS TESTED.

(Continued from page 1116)

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No need to rebuild! Will take every Set and heaviest batteries. Full Lists FREE. PICKETT'S CABINET (P.W.) WORKS, BEXLEY, HEATH, KENT.

valve. Continuing outwards we find another grid and anode, and here again the grid is placed between the anode and filament, making a second three-electrode system.

"Now, since we have a grid and anode of two separate systems on each side of a common filament, it is clear that any voltage impulse on No. 1 grid will not only affect No. 1 anode, but also No. 2 anode, and the same reasoning applies to No. 2 grid. Now, in spite of the fact that on first sight it may seem that such an action would tend towards inefficiency, this is not so, due to the minute currents flowing in the first stage (a few microamperes).

"It will be observed that the total anode current taken by the whole valve when working the loud speaker is approximately one milliampere, almost all of which is flowing via anode No. 2. This may be shown by disconnecting No. 1 anode entirely."

We tuned in 2 L O on a "One-Der" at a point some eight miles from that station. A very average sort of aerial and earth system was used. Speech was plainly audible at any point in a medium-sized room, while the music came through with sufficient volume to make the programme quite enjoyable. The volume was not as great as that which one could obtain from a two-valver incorporating a stage of transformer-coupled L.F. amplification, but the reproduction was excellent and much better than that delivered by the average commercial set using two valves. 5 G B was a trifle weaker, but quite comfortably audible twelve or fifteen feet from the speaker.

Impressive Performance.

The set is very selective, and 2 L O could be completely cut out in the matter of a few degrees on the dial. Taking everything into consideration, we must say we were rather impressed by the performance of the little outfit, and we have no doubt whatever but that it will attract considerable attention when facilities are made for listeners to hear it demonstrated in different parts of the country. Those who require a simple-to-handle and easy-to-maintain set capable of providing rather restrained but good quality loud-speaker results, should certainly make a point of closely inquiring about this Ediswan "One-Der," and, if possible, hearing it in operation. It sells at £5 10s., including all royalties, and the valve—an E.S.220 "One-Der" valve—can be obtained at 22s. 6d.

This latter, we must point out, is not an English version of the Loewe valve. The coupling components are contained in the set, the valve itself acting as a special valve only.

A CORRECTION.

The makers of the Accumulator Capacity Indicator recently described in these columns were given as the Fanshaw Manufacturing Co. of Walsall. Will readers please note that the actual manufacturers of this device are The Central Manufacturing Co., Crown Works, Birmingham Road, Walsall.

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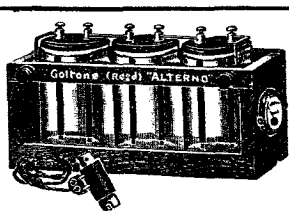
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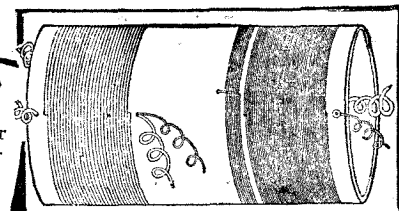


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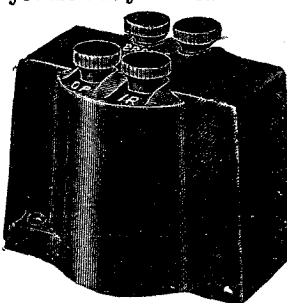
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SHORT-WAVE NOTES.

By W. L. S.

MY prediction that the bad spell would be followed by the return of abnormally good conditions has been amply borne out, for during the last week the American stations have been as good as I have ever heard them since the short-wave craze originated. The "hams" have been logged literally in their hundreds between 35 and 43 metres, and 2 X A F and 2 X A D have been extremely strong at the most favourable times.

The American commercial stations have one good point, if only one—and that is the manner in which they serve as useful indicators as to what conditions are going to be like on any particular night. WIZ, for example, on 43 metres, on account of his very high power, is audible for a long time before the amateur stations commence to make themselves heard, and consequently the strength of WIZ at, say, 9.30 p.m. is a very good indication of what the amateur stations are going to be like by 11 p.m. or so.

The New Wave-lengths.

The new amateur wave-lengths which come into operation on January 1st, 1929, are, of course, quite different from those now in use, but fortunately they are placed in "harmonic relation," and are very convenient from several points of view. Roughly speaking, the bands set aside for the use of amateur workers are 150-175 metres, 75-85 metres, 41-43 metres, 20-21 metres, and two shorter bands. Incidentally, every British amateur owes a personal debt of gratitude to Mr. Warner of the A.R.R.L. But for him we should not have had even these narrow bands set aside for our use.

The problem of the distribution of stations is going to be even more acute when these wave-lengths come into force, since instead of having the American stations on bands slightly different from our own we shall all occupy one common band. The sudden addition in a band of about 2 metres' width of about 2,000 American stations is slightly apt to complicate things!

The Evening "Fade-out."

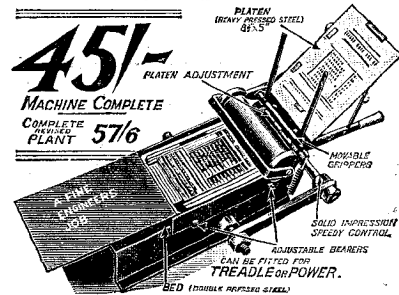
Now that we are well past the shortest day the time of the evening "fade-out" is becoming slightly later each day instead of earlier. In view of the wintry conditions at the time of writing one is rather apt to overlook the fact that summer is coming! The European stations (or, at any rate, those in the nearer countries) still seem to disappear fairly suddenly at about 6 or 6.30 p.m., but this time seems to get about three or four minutes later on an average each day, and the distant Europeans will soon be audible right up to midnight.

A friend was arguing the other day that short waves would never be of any practical value until this fade-out effect was conquered, and work could be carried on throughout the twenty-four hours. I gently pointed out to him that it must be a distinct improvement over the old long-wave conditions if one can do, for two hours only, something that could not be done at all before!

Popular Wireless, January 28th, 1928.

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NEWS FROM SAVOY HILL.

(Continued from page 1090.)

are purely experimental and therefore of a temporary nature.

The ultimate intention is the building up of a regular and guaranteed exchange of the best programmes between all European countries, not, as is happening now, by each giving a concert of works selected by another, but by actually broadcasting programmes direct from their places of origin.

"Shadows" Again.

Although it takes but twelve minutes to perform, no play broadcast during the last year was productive of more uninvited letters and appreciations from listeners than "Shadows," a thrilling little drama by Valerie Harwood, which was performed in the London studio on December 15th.

It was therefore, only to be expected that another place would be found for it in a forthcoming transmission—on Monday, February 13th—when during an hour to be filled by the Productions Department it will be given, together with a comedy entitled "Her Tongue," by Henry Arthur Jones. The latter play was also well received when it was given from 5 G B last October.

"Ourselves as Others See Us."

Whoever conceived the idea of the series of talks which for some time past have been given from London and other stations under the title of "Ourselves as Others See Us," deserves the thanks of listeners for providing something of interest in the otherwise dreary mass of talk.

The next talk of the series takes place at 9.15 p.m. on Monday, February 6th, Dr. S. K. Datta being the speaker. Dr. Datta is a distinguished Indian who has devoted his life to social and educational work in his own country, and is the National General Secretary of the Indian Y.M.C.A. He spent five years at the Edinburgh University and has paid several subsequent visits to this country. Until recently he was a member of the Indian Legislative Assembly.

A Gerard Williams Programme.

Mr. Gerard Williams, a short programme of whose music is to be broadcast from London and other stations in Thursday, February 2nd, had the distinction of being an architect before he became a musician, a fact that probably explains why his manuscript is a model of neatness and perfection of detail.

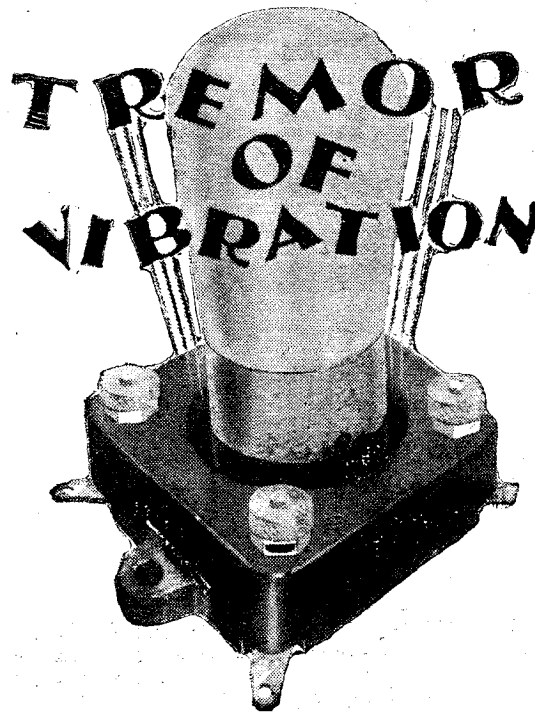
He is one of those natural musicians who have not been through the orthodox collegiate training, and yet by self-study and the aid of friendly criticism achieve elegant style and technique. His work, "Pot Pourri," which was one of his first to attract attention a few years ago will be included in the programme, which Mr. Stanford Robinson is to conduct.

The Lena Ashwell Players.

Few organisations have done so much by unselfish effort and sheer perseverance to bring good plays to the masses than the Lena Ashwell Players, not only by performances in their own little theatre off

(Continued on next page.)

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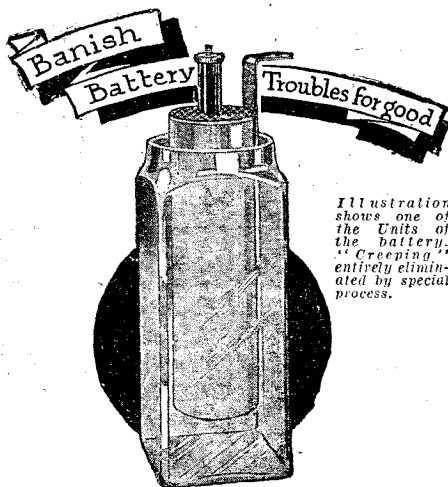


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NEWS FROM SAVOY HILL.

(Continued from previous page.)

Westbourne Grove and at the many small halls in the London suburbs, but also in village halls and more pretentiously named buildings in the towns. The company is visiting the London Studio on Wednesday, February 1st, to present scenes from "Macbeth," when Lena Ashwell herself will take the part of Lady Macbeth.

Boy Scouts—Stand By!

All young people, whether or not they are connected with the Boy Scout and Girl Guide organisations, will do well to tune-in to London and other stations on Thursday, February 2nd, for the first of a new series of talks to be given jointly by these associations on alternate Thursdays during the next few weeks. The subjects to be reviewed, such as first-aid, hobbies, scout-craft, and citizenship, should make a wide appeal, and even in these supposedly enlightened times there are many grown-ups to whom a few instructions on first-aid, with which Mr. McNeil Love, Scout Commissioner for Poplar, begins the series, may easily prove to be invaluable in our present life of hustle and bustle.

Belfast Events Next Week.

Anna McClure Warnock, the authoress of two little Irish comedy sketches, "The Wisdom of Fools" and "The Quilt," which Belfast is broadcasting on Thursday evening, February 2nd, will herself play the part of Mrs. Sarah Anne Mellwaine, widow of an Irish farmer, and one of the principal characters in the latter play.

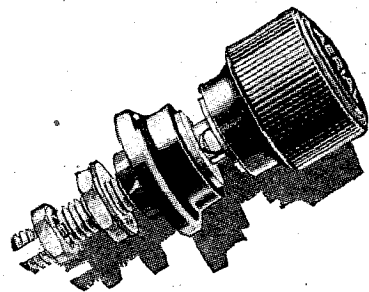
The whole of the programme that evening will be Irish in character, and will include well-known airs, arranged for violoncello and pianoforte by Arnold Trowell, played by James Marshall (cello). Some jigs, hornpipes, and Leinster song tunes will also be given by R. L. O'Mealy, the well-known exponent of the Villan pipes. On the following evening a concert of popular music will be provided by the band of the 1st Battalion the West Yorkshire Regiment (The Prince of Wales' Own), interspersed with groups of English and Irish ballads by Ernest Davison (baritone).

Lord Knutsford's Appeal.

Lord Knutsford, Chairman of the London Hospital since 1896, is broadcasting an appeal on behalf of that famous hospital, easily the largest in England, from London and other stations on Sunday evening, February 5th. Not only does the "London" serve the East End, but its benefits to other hospitals all over the country are far-reaching, as it is the centre of curative research and pioneer work for which it is magnificently equipped.

Unfortunately, it is not adequately endowed, and has to depend for four-fifths of its income on the generosity of the public. Lord Knutsford holds the "world's record" in extracting money from the public for charity by radio. At one of his early appeals from 2 L O he was stated to have "lifted" £10,000 as the result of a five minutes' talk. What will he raise on February 5th?

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Both types guaranteed.

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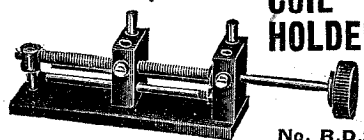
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TECHNICAL NOTES.

(Continued from page 1090.)

occupied by these is saved. Therefore, a variometer has the merit of compactness.

Wave-length Change.

On the other hand, it is very convenient to be able to change the wave-length range of the circuit by means of plug-in coils (or a switch) and tuning by means of a variable condenser, especially with any of the really beautiful slow-motion dials now available, is a matter permitting of considerable precision. The variometer, however, is in my opinion, by no means dead, and I should not be at all surprised to find it regain at any rate a good deal of the favour which it formerly enjoyed.

Variometer Resistance.

Talking of variometers, the resistance of the two coils of a variometer—I mean, of course, the high-frequency resistance—might be expected, at first sight, to be equal to the sum of the H.F. resistances of the two coils, since the two are in series. This has been found, however, to be far from being the case. In fact, experiments on this point have shown (as would be expected after a moment's consideration) that the overall high-frequency resistance of the variometer depends upon the adjustment of the instrument, that is, upon the coupling between the two coils.

So far from the high-frequency resistance of the variometer being constant, it has been found to be roughly proportional to the inductance—that is, the effective inductance—of the instrument. In the case of a variometer in which the maximum inductance was about ten times the minimum inductance, it was found that the high-frequency resistance at the maximum inductance adjustment was also roughly ten times the high-frequency resistance at the minimum inductance adjustment.

Effective Inductance.

If the high-frequency resistance is proportional to the effective inductance, the ratio of the one to the other will be constant, which is simply another way of expressing the same thing mathematically. But it was found in the experiments referred to that, although the ratio of the two is constant for the greater part of the range of the variometer, the ratio of the high-frequency resistance to the inductance increased rather suddenly in the region of the minimum inductance of the variometer. In other words, round about that position the high-frequency resistance was decidedly greater than it ought to have been if the above-mentioned relation had held true. This indicates that, at any rate in the particular case under investigation, the efficiency of the instrument was distinctly lower round about the minimum inductance setting.

Tapped Coils.

These results are quite different from those obtained with a tapped coil. In this latter case it is generally found that the resistance increases more rapidly than the inductance of the coil, or, in other words, the ratio of the H.F. resistance to the inductance increases as the inductance increases.

(Continued on next page.)

ELECTRADIX RADIOS SALE

1,000 ACCUMULATOR FILLERS. Suction bulb, celluloid chamber and nozzle. For changing acid and testing Sp. Gr., 1/6. Hydrometers, 1/6

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R.A.F. MASTS. 2 ft. 8 in. Steel Tube, 1 1/2 in. sockets, sections, 15 ft., 7/6; 20 ft., 10/-; and 30 ft., 14/-; Heavy 4 ft. 3 in. sections, 2 1/2 in. dia., 5/- each.

EARTH MATS. Galv. Wave Plate, with Electron wire, 2/-; post 9d. Copper Mesh Earth mat for short waves, 5/6 each. Earth Spikes, 1/3. Earth Tubes, 2/6.

BUZZERS, 1/-. Townsend Wavemeter, 2 6. D.I.I., 10/-. Siemens' 25 S.A. Signal Outfit, 27/-. Sounders, 16/6. Signal Lamps, 3 cols., 3 Tap Keys, 4 1/2 volts, 7/6. Buzzers with key and phone, 7/6. Signal sets, 22/6.

BOXES. 11 1/2 in. by 10 in. by 2 in., for storing coils, 2-hinge tops, 2/-. Boxes with plugs for H.T. Batteries, 5/-. Valve cases, 1/6. Brown's 2-relay cabinets, with fittings, 5/-. Three-cell valve boxes, padded, 1/6 each.

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Mfd.	Plain.	Vernier.	Law.	Vernier.
-001	1/6	2/-	2/9	3/6
-0005	2/6	—	3/-	—
-0003	2/-	2/-	2/6	2/6

POLAR. Full dial sq. law, -0003 mfd., 3/6; -0005 mfd., 4/6; list 12/6. Panel 3-gang Triple, 8/-, list 15/-. Penton -001 Panel, 1-hole fixing Varia. Condensers, 2/6, list 8/-.

DUAL VARIABLE CONDENSERS. -0005 Square Law, 6/-; 3-gang do., 8/-.

FIXED CONDENSERS. 200 volt ex-W.D., 2 mfd., 1/9; 1/36 mfd., 6d. 1 Jar Glass Dielectric, 20,000 volt, 2/6. Post 1/3. Naval Lab., Mica Dielectric, 2,000 volt, 3 1/2 mfd., with all plugs in, 35/- each. Variable Condensers, -0015 Oil, 2,000 volt, 20/- each. Post 1/3. 400 volt to 10 mfd., 15/-; 400 volt, 4 mfd., 6/6; 2 mfd., 4/3.

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STERLING PRECISION LABORATORY standard Variable -001 Condensers, enclosed, 18/- each. Post 1/-.

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H.F. CHOKES on Ebonite. Townsend, flat, small, 1/6. Large, 2/6. 1,000 ohms round, Hendon, 3/6. Marconiphone, 800 ohms, 100 milli-henries 4/6.

SUNDRIES. Adj. Spark Saps, Alumin., on Ebonite, 2/-. 3-volt Siemens' Dura Cells, 1/3. Steel Permanent Magnets 1/-, 2/6 & 3/6. Loud Speakers, Western Electric 2,000 ohms, 15/-, W.E. Units, 10/-. Violina Loud Speakers, 25/-, 5-guin. model. Ask for leaflet.

FIXED RESISTORS. Michrome wound on mica, Copper clad, 6d. Polar Rheostats, 9d. each.

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SPARK SETS. 10-in. Marconi coils, £7; Cox X-rays, £10; Diathermy 1 KW. 100 v. D.C. to 10,000 v. A.C., £15; 250 watt 500 v. Alternators, 70/-

X-RAY VALVES and TUBES, 30/-. Battery Home Chargers, £3 5s. 8-way Lucas Chargers, 4/6. Relays, 80d., 7/-. Navy Stabilising Gyroscopes, 15/-. Mains H.T. Unit, D.C. 3 taps, 35/-. A.C., £4. Transformers only, 25/- each.

LOW LOSS INDUCTANCE. 10 taps to plugs, ebonite panel, 5/-. Sullivan Aerial Couplers, 10/-. R.A.F. Coupler, 4/6.

VARIOMETERS. B.B.C. on ebonite, 2/6; Polar Cosmos Mounted Variometer, 8/6. Plug-in Coils, 35, 50, 100, 150, 200, 1/3 each.

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FULL-WAVE RECTIFYING TRANSFORMERS. Double wound for A.C. mains, 110 or 220 volts, 40, 50 and 60 cycles, two centre tap secondaries for H.T. and L.T., 20-m/a, 25/-; 50-m/a, 37/6 each. Complete Outfit of parts and cabinet, £3 10s. Valves, 8/6.

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SWITCHBOXES. Lucas 3-way Switches, walnut case, flush metal cover, 3 Levers, 1/6. Grid. leaks, R.A.F., 2 and 4 megs., 1/-; 10 megs., 1/9. Marconi Sterling, all ranges, 1/2. Mica Sheets. Best Ruby Mica for Condensers, 2 by 2, -002 thick, 1/- per doz.

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PROTRACTORS, Taylor Hobson, leather case, 7/6. Angle Telescopes, with prism, 5/6. Electric Projectors 200 c.p., 25/-

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PURE RUBBER TAPE, in tins, 6d. Adhesive White Tape, in tins, 4d. The famous Mark III 100B real W.D. Double Terminals, with 4 B.A. nut and washer, 1/3 for 6. Pat. Spring Terminals for pen and spade, 3/- doz.

SUNDRIES. Aeroplane Aerials. 110 ft. 7-strand H.C. Copper wire on bobbins to run freely. Sale price, 1/3. Postage 3d. Brown's Swivel Headbands, 2/- per pair. Portable Set Cabinets, hinged lid, ebonite panel, 12 by 8 by 6 1/2, 10/6. Polar Vernier 2-coil Holders, new, 2/6. Microphone Transformers, 3/6 & 5/-. Sensitive Microphone Buttons for Speech, Radio Transm., or Detectophone, 1/-.

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HEAREASY 'PHONE PADS, SOFT RUBBER. Light and comfy. Are a boon to 'phone users, 4d. pair. Sullivan Phones, 3/- per pair.

DYNAMOS. You are looking for a cheap Charger. Write to us.

BATTERY CHARGERS, 100 or 200 volts D.C. or A.C., £3 10s. Anode Converters, £4 10s.

AUTO. CUT-OUTS. Protect your battery. Magnetic Lucas, 12 volts 8 amp., 10/6.

Our 4d. Catalogue containing 600 unique illustrations will save you pounds.

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ELECTRADIX RADIOS,


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Reliability

WIRELESS COMPONENTS
GIVE UNEQUALLED SERVICE

Order from this List and save money.
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WIRELESS CABINETS

For Panels 7 in. high. Width 8 in. Hinged Lid, Oak, 12 in. 17/-, 14 in. 17/6, 18 in. 18/6 Mahogany 1/- extra



KEY (21) SWITCH.

1-Hole Fixing 1/-



IZION HAND (15) DRILL


Takes Drills up to 5-16 in. Only 3/6 Six Drills 1/- extra

SIX-SOCKET COIL BASE, WITH TERMINALS	1
DOUBLE-SCALE VOLTMETER, 0/5 0/120 v.	5
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EX.-GVT. 120-OHM SULLIVAN'S HEADPHONES	3
ERISSON '0005-MFD. VARIABLE CONDENSERS	3
S.O.S. THREE-BEAD HYDROMETERS	3
R.A.F. TELEPHONE & MODULATION TRANSFORMERS	5
HANDLED 45-PIN COILFORMER & INSTRUCTIONS	3
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EXPERIMENTERS' PARCELS, CONTAIN 20/- VALUE	5
COSSOR MELODY-MAKER COIL, "GOLDTONE"	5
LISSON H.F. or L.F. CHOKE COILS, RECOMMENDED	5
R.I. & VARLEY GEN. PURPOSE L.F. TRANSFORMER	15
BRITISH STANDARD VALVES, ALL TYPES, EACH	5
OLDHAM 10-VOLT H.T. ACCUMULATOR UNITS	5
FERRANTI TRANSFORMERS, AF4, 17/6; AF3, 25/-; AF5, 30	0
LISSON BATTERIES, 60 v., 7/11; 100 v., 12/11; 9 v., 1	6
HEADPHONES, B.T.H. 15/-; RELIABILITY ADJUST.	8
TANGENT L.F. TRANSFORMERS, 7/-; CROIX, 5/9; A1	5
NEW CLAYTON EBONITE CUTTINGS, Per lb.	1
RELIABILITY WIRELESS GUIDE, No. 999, Post Free.	3

J.H. TAYLOR & Co.
4. RADIO HOUSE.
MACAULAY ST., HUDDERSFIELD
Tel. 341. Grams: "THOROUGH" HUDDERSFIELD. Mark of Reliability

RADIO REGISTERED PANELS

7x 6, 1/3
8x 6, 1/4
10x 8, 2/1
10x 9, 2/4
12x 10, 3/-
14x 12, 4/-
14x 7, 2/7
16x 8, 3/2
8x 5, 1/2



9x 6, 1/7
11x 8, 2/3
12x 8, 2/6
12x 9, 2/10
14x 10, 3/5
16x 9, 3/6
21x 7, 3/7
24x 7, 4/-
2 in. thick.
Post Free.

Money back guarantee that each and all Panels are free from surface leakage. Megger test infidelity. **CROXSONIA CO., 10, South St., Moorgate, E.C.2**

Phone: 1. Clerkenwell 7853

Agents: John Henry Smith, 139, Anlaby Rd., Hull.
L. H. Helyar, 82, Chamberlin Rd., Norwich.
A. Stredwick & Co., 27, The Market, Chatham.
Boynton & Co., Ltd., 34, Bradford St., Birmingham

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We offer Traders finest value obtainable. Write for List D13 and save money. Trade only supplied.

SUPERLAMP LTD., 92-94, Paul St., E.C.2.

IDEAL FOR SOLDERING

Used with META SOLID FUEL this burner will simplify your wireless soldering jobs.

6d. Each.

ELMESAN (LONDON) LTD., (Dept. A), 66, Victoria St., S.W.1

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UNIDYNE 4-ELECTRODE VALVES

We are now the sole suppliers of the genuine U.O. and Thorpe valves, as specially tested and recommended by the Unidyne inventors and Cash with "Popular Wireless" U.O.5 Order and Thorpe K.4 (both 4-electrode 5-pin valves). Post free. Only direct from—

UNIDYNE VALVE CO., 1, CHARING CROSS LONDON, S.W.1

PLEASE MENTION "POPULAR WIRELESS" WHEN REPLYING TO ADVERTISEMENTS

A TWO-VALVE L.F. AMPLIFIER

(Continued from page 1102.)

the amplifier for the best results and also how to join it up to your existing set.

You will need two suitable valves, and these can be 2-, 4- or 6-volt, whichever you prefer.

The first L.F. valve can be a small power valve or one of those designed for general-purpose use. The last-named will probably give greater volume.

Amongst those suitable may be mentioned the Cossor 610H.F., Marconi or Osram D.E.L.610, Mullard P.M.5X, etc. These are 6-volt valves, but they have their equivalents in the 2- and 4-volt classes.

In the second valve holder you will need a small power valve, such as the B.T.H.B4, Cossor 610L.F., Marconi or Osram D.E.P.610, Mullard P.M.6, Cosmos S.P.55/R, etc. Here, again, the equivalent 2- or 4-volt types will be satisfactory.

Connecting Up.

For these valves a 9-volt grid battery, tapped at every 1½ volts, should be used, and the H.T. battery can have a value of 120 volts.

Place the two valves in their correct valve holders, and join up your H.T. and L.T. batteries. Insert the H.T. + plug into the 100 or 120-volt tapping on the H.T. battery, and connect up the grid bias before switching on the valves. For the grid bias which is connected through the R.C.C. unit 3 volts will suffice, and in the case of the second valve about 7½ to 9 volts should be satisfactory at the H.T. voltage suggested. The unit is now ready for use.

Perhaps you are a little doubtful as to the correct manner of connecting the unit up to your set. Well, suppose you have a single-valve set with swinging-coil reaction. Join the "input" terminal on the amplifier to the 'phone terminal on the set, which is already connected to H.T. +. Connect A₁ and A₂ on the unit together with a piece of wire. Join "Input A₂" to the telephone terminal which goes to the reaction-coil lead, and remove the fixed condenser (if any) which is connected between the two 'phone terminals.

An Important Point.

You will only need one H.T. battery, and so you can take a second H.T. + tapping from this battery to H.T. + on the existing set. There is no need to take a second H.T. - lead to H.T. - on the set, only one H.T. - being necessary if one H.T. battery is used. Please note, this is important.

If the receiver is a Reinartz single-valve the connections will be the same except that there is no need to join A₁ to "Input A₂" and, of course, the second 'phone terminal will go to the H.F. choke in the set and not to the reaction coil.

If your set is a simple crystal receiver join the existing telephone terminals to "Input" and "Input A₂." The telephone terminal which is joined to earth should go to "Input."

With a crystal set it is sometimes advisable also to connect L.T. - to earth, and this should be tried, because otherwise the L.F. valves may tend to howl.

TECHNICAL NOTES.

(Continued from previous page.)

The fact that the H.F. resistance of a variometer is—at any rate for the greater part of the range—substantially constant is quite an important point in favour of the variometer, and I would like to refer to this point again in a week or two.

"Secret Process" Batteries.

Two or three high-tension battery makers are now advertising "special process," or "secret process" batteries. A notable example is the new Lissen H.T. battery.

The actual processes involved are, of course, trade secrets, but in most cases they are intended to have the effect of preventing the contents of the cells from drying up and also to make them regenerative, so that the chemical action which takes place during discharge is neutralised or compensated for during periods of rest.

As every experimenter knows, the greatest enemy of a "dry" H.T. battery is continued exposure to warmth, since this makes the battery truly dry instead of being only nominally dry. A so-called dry battery is only dry in the sense that the moisture within it is held in such a way as to be completely sealed in or unspillable, but it is impossible for a battery to operate without moisture, and if the moisture is driven off (by leaving the battery in a warm place for long periods) the battery becomes in truth a dry battery and ceases to function. All manner of ingredients have at different times been introduced into dry batteries for the purpose of retaining a sufficient quantity of moisture, and very ingenious and careful methods have been adopted for sealing up the individual cells.

Regeneration.

As to the regenerative process, this, as I have already said, is intended, during periods of rest, to dispose of the products of chemical reaction which are produced during discharge, and also to cope with the polarisation which tends to occur when the battery is in action.

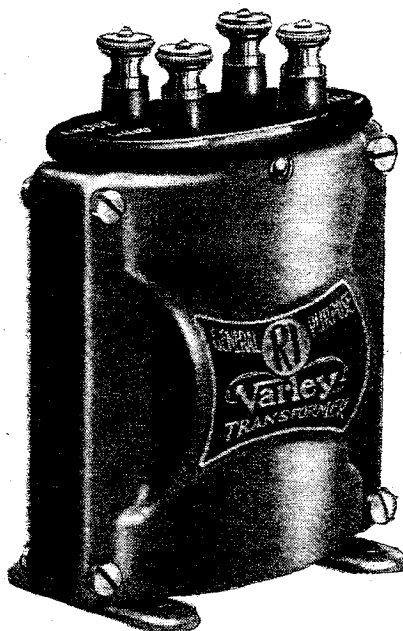
The latest Lissen H.T. battery, judging from the drastic tests to which the manufacturers have submitted their batteries, and also from the considerable use to which I have myself put various samples of this battery which have been submitted to me, seems to be an excellent product and a very great improvement on the type of H.T. battery to which one was accustomed a few years ago.

Corroded Terminals.

A very interesting and useful system for dealing with accumulator repairs is in use by a Yorkshire engineer, who lays himself out specially to deal with overworked or ill-used wireless accumulators. The principal feature of his system is the use of high-pressure steam jets, at a pressure of 80 to 120 lb. to the square inch, for cleaning corroded terminals, for softening the sealing compound (used in some types of accumulator) prior to the removal of the plates, and, finally, for thoroughly cleaning the plates themselves and removing all traces of acid and dirt. The corrosion from the terminals is removed very readily by the use of the steam jet, and terminals which it was impossible to move with pliers become easily manipulated by hand.

"It must have been very skilfully designed"

"Vide 'Popular Wireless,' Jan. 7th, 1928."



15/-

Ratio 1 to 1.

"It must have been very skilfully designed, for it gave results far superior to those its price would lead one to anticipate. In fact, we must admit that we consider its performance falls very little short of transformers in the one-pound class."

This is an extract from a test report by POPULAR WIRELESS, under the heading "An Efficient L.F. Transformer," in their issue of the 7th of January, 1928:

The results obtained with this wonderful little transformer have been truly remarkable. Take the case of the Mullard Master Three. If you substitute a cheaper Transformer the signals from a large number of stations are so faint as to be hardly audible even on earphones, and the quality of reception from the very few that can be heard is distinctly poor. Now, use the R.I. & Varley General Purpose Transformer (that specified by the designers of this efficient Receiver), and at once the number of stations which can be heard at good loud-speaker strength are more than trebled, and the quality of reception is improved out of all proportion. *Actually, 26 stations have been logged at Loudspeaker strength 2 miles from 2 L.O. on the Master Three, using our G.P. Transformer.* Of course, if you want still better results build the Master Three with the R.I. & Varley Straight Line Super Transformer. You will be able to listen in to still more stations on the loudspeaker, and the increased amplification of the very low frequencies will add still further to the "roundness" of the reception. The patented system of winding, which, owing to the small self-capacity takes care of the high notes as well as the low, adds wonderful realism to the reception of both music and speech.

Our 16-page illustrated leaflet C.14—free on application—gives full particulars of all types of R.I. & Varley Transformers.

Mullard
The Master Three

Mullard
The Master Three

THE MARK OF



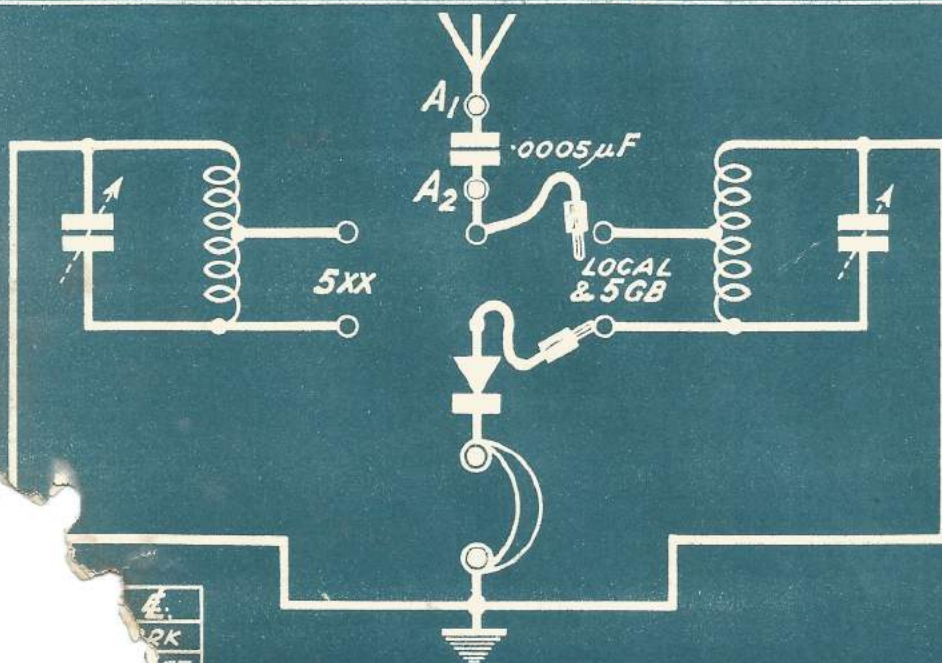
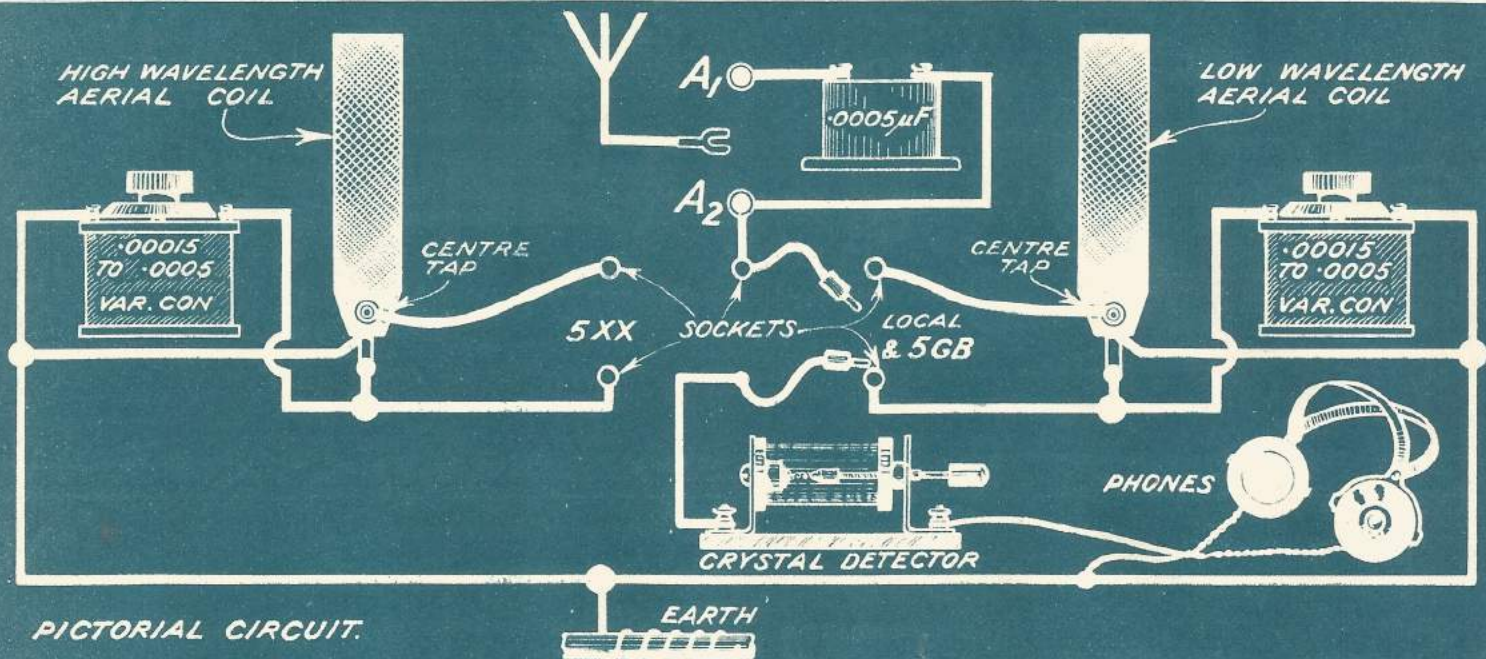
BETTER RADIO

Kingsway House, 103, Kingsway, London, W.C.2.

Telephone: Holborn 5303.

THE "P.W." BLUE PRINT CIRCUIT No. 37—

The "Long-Short" Crystal Set

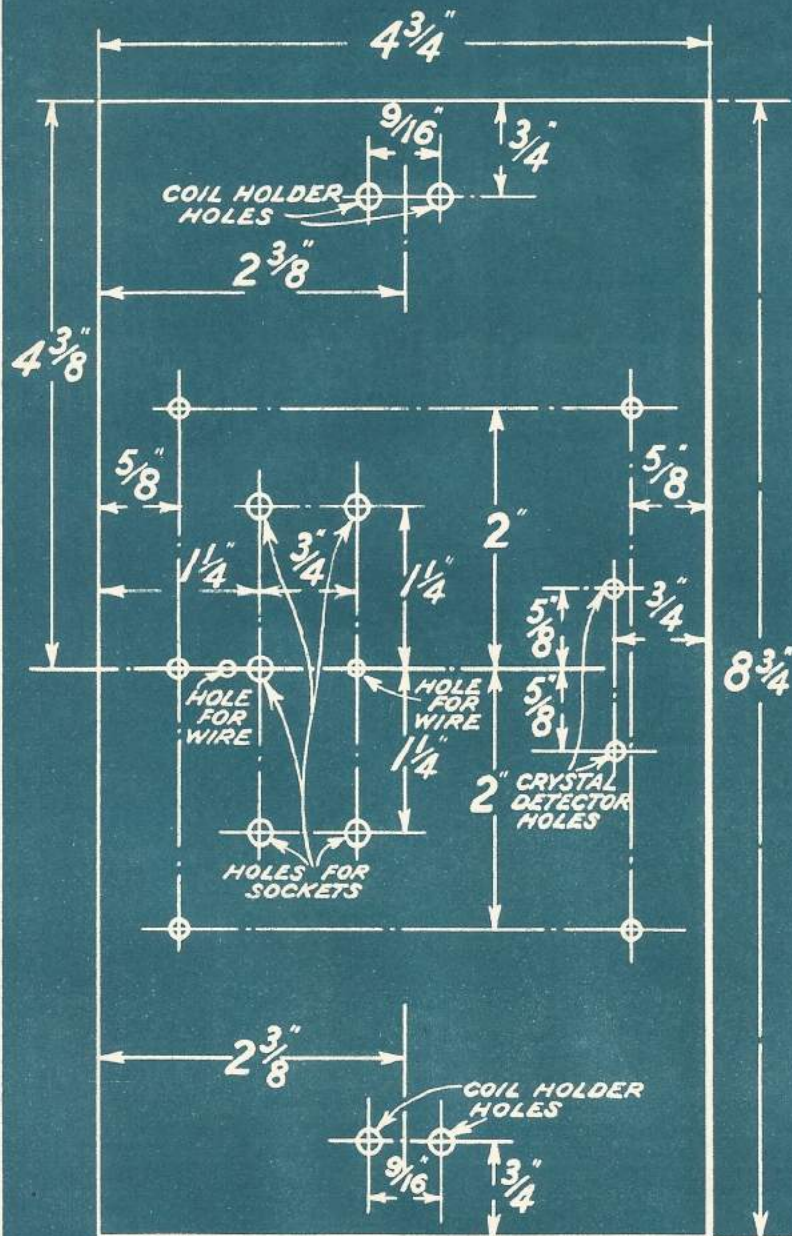


COMPONENTS

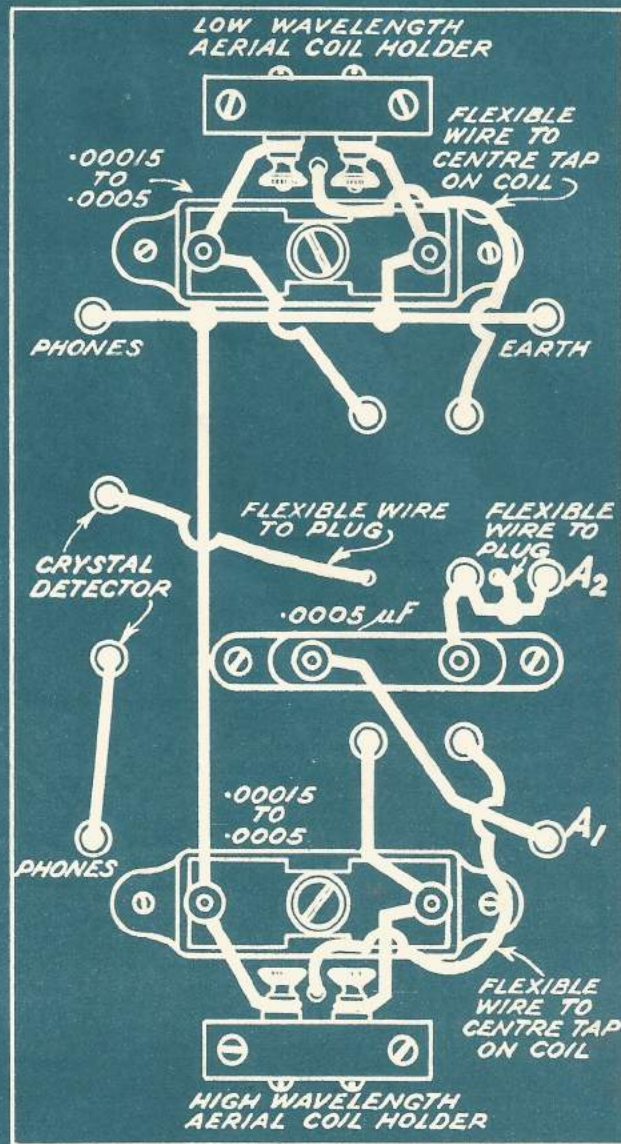
- 1 Panel, $8\frac{3}{4}$ in. \times $4\frac{3}{4}$ in. \times $\frac{1}{4}$ in.
- 1 Flat-topped box to fit, about 3 in. deep.
- 2 Panel-mounting single-coil sockets.
- 2 Compression type semi-variable condensers, .0005 mfd. maximum. Either board mounting to be attached to underside of panel, or panel mounting, in which case the adjusting knobs will project through the panel for adjustment from above.
- 1 .0005 mfd. fixed condenser.
- 5 Terminals.
- 5 Small sockets and 2 plugs.
- 1 Crystal detector.
- Wire, etc.

ACCESSORIES

- 1 No. 60 centre-tapped coil.
- 1 No. 200 centre-tapped coil.
- Pair of telephones.



PANEL LAYOUT.



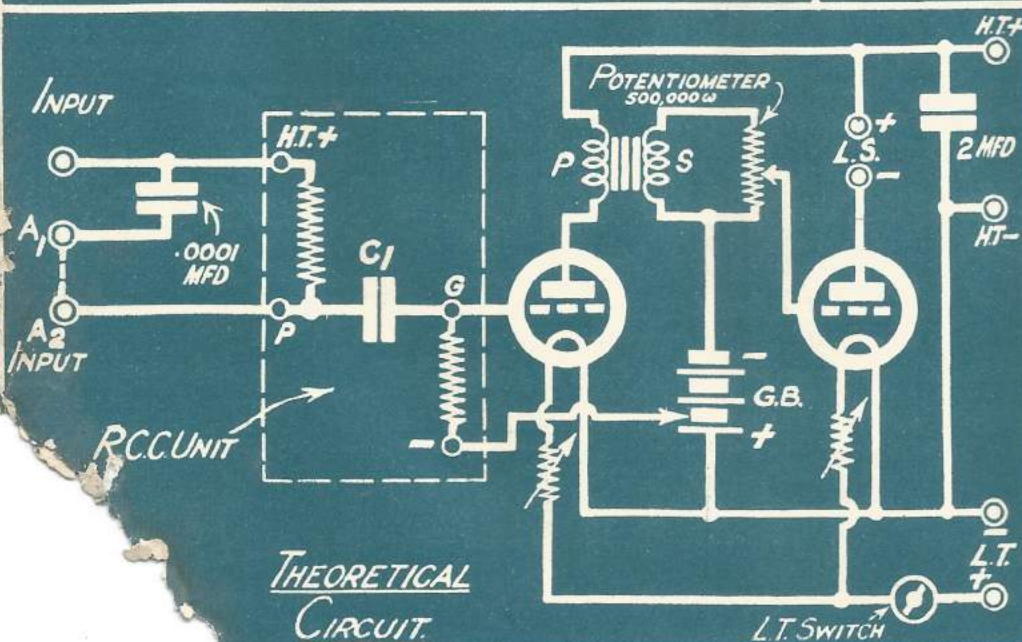
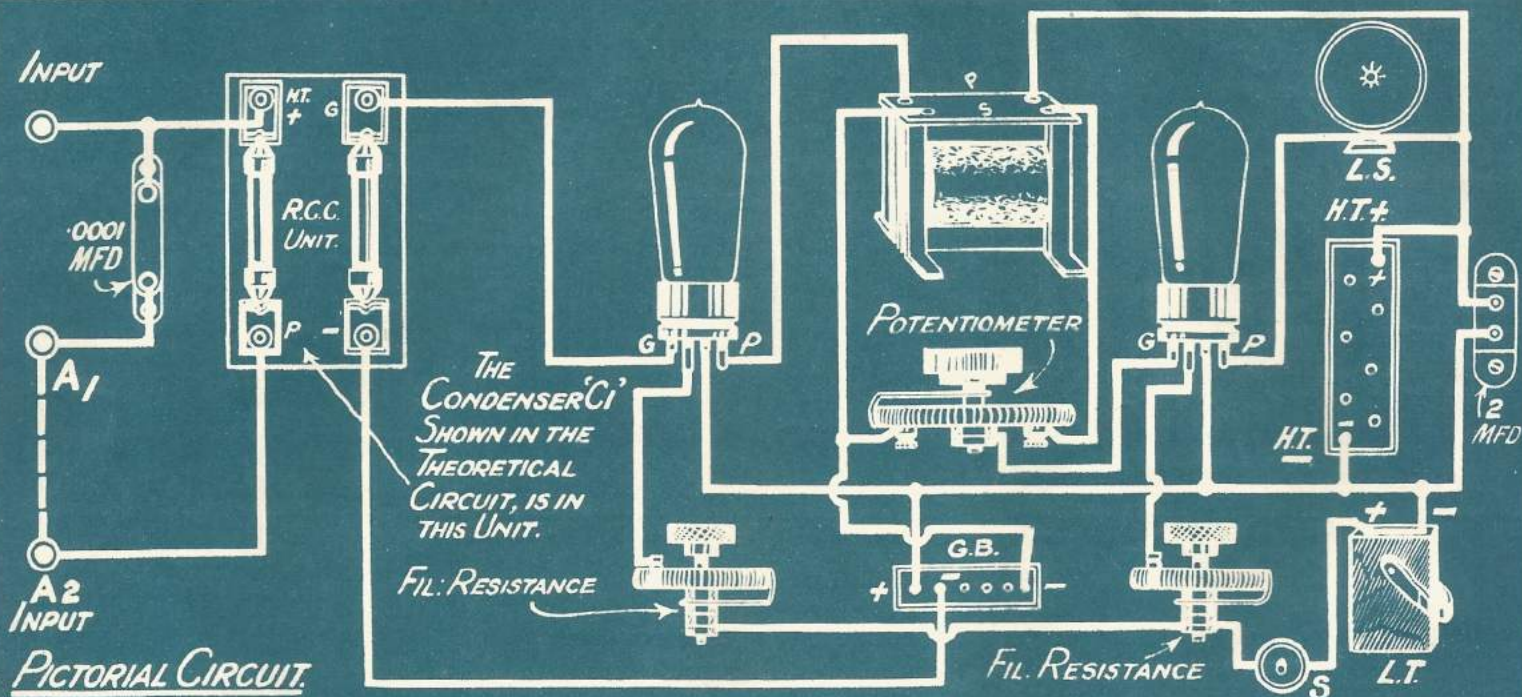
WIRING DIAGRAM.

DRAWN BY	E.
CHECKED BY	BRK
SERIAL NO	37A

A simple long- and short-wave set for changing over from 5 X X to the local by moving two plugs. To receive shorter wave plugs in sockets nearest "low-wave" coil, and vice versa. To increase selectivity put detector plug in socket near A2 terminal further connect aerial to A1 instead of A2. (Always try this with large aeriels).

THE "P.W." BLUE PRINT CIRCUIT No. 38—

A Two-Valve L.F. Amplifier

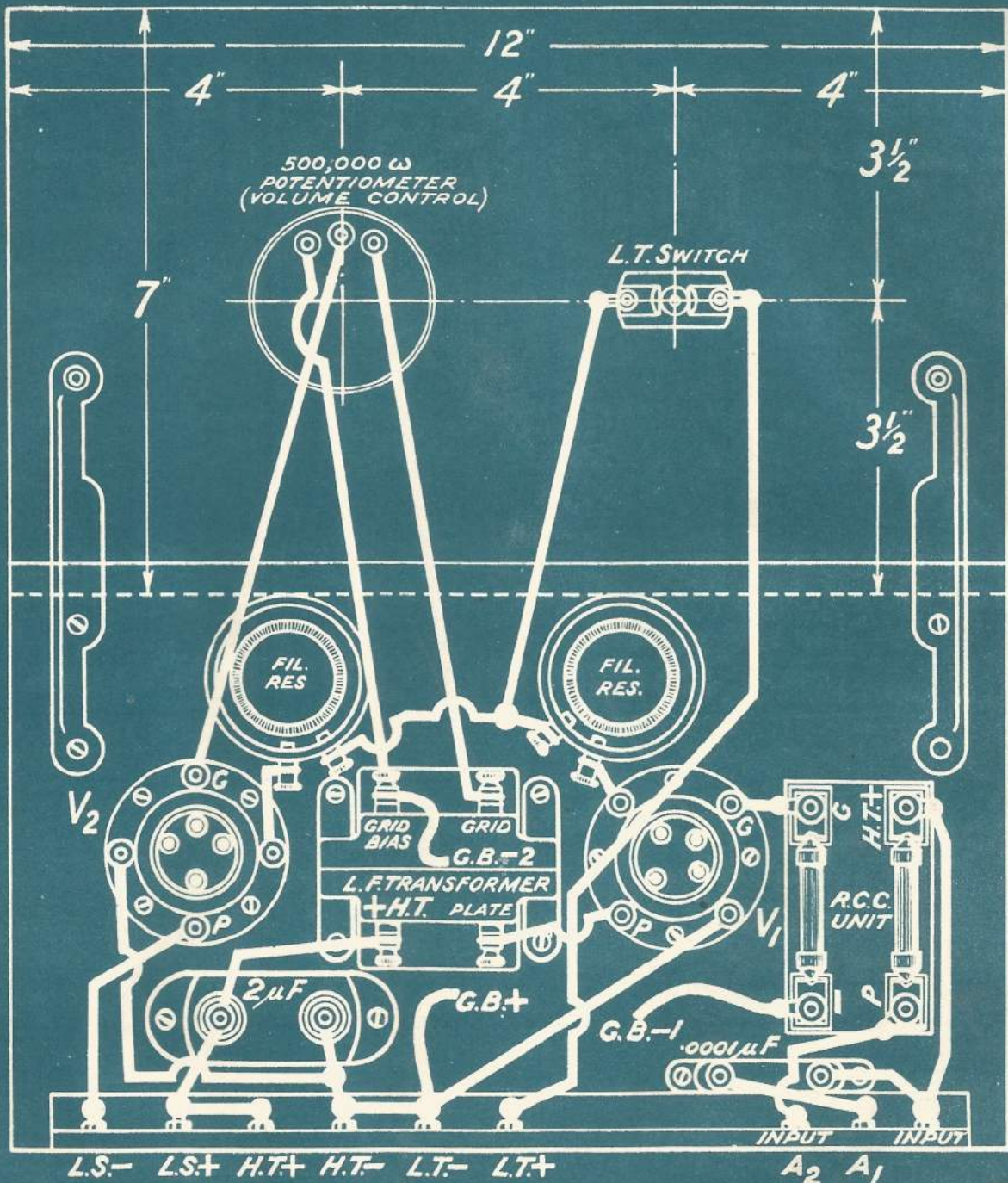


COMPONENTS

- 1 Panel, 12 in. × 7 in. × ½ in.
- 1 Cabinet to fit, with baseboard 7 in. deep, and pair of brackets.
- 1 Resistance-capacity coupling unit, with anode resistance of about 250,000 ohms and grid leak 1 megohm.
- 1 L.F. transformer, low or medium ratio.
- 2 Sprung valve holders.
- 2 Baseboard rheostats or resistors.
- 1 On-Off switch.
- 1 High-resistance volume control potentiometer. Not less than 500,000 ohms.
- 1 Fixed condenser, .0001 mfd.
- 1 Mansbridge type condenser, 2 mfd.
- Terminal strips with 9 terminals.
- Wire, etc.

ACCESSORIES

- 1 L.F. or H.F. valve for V1. (See transformer maker's instructions on this point).
- 1 Power or super-power valve for V2.
- H.T., L.T. and grid-bias batteries to suit valves.
- Loud speaker.



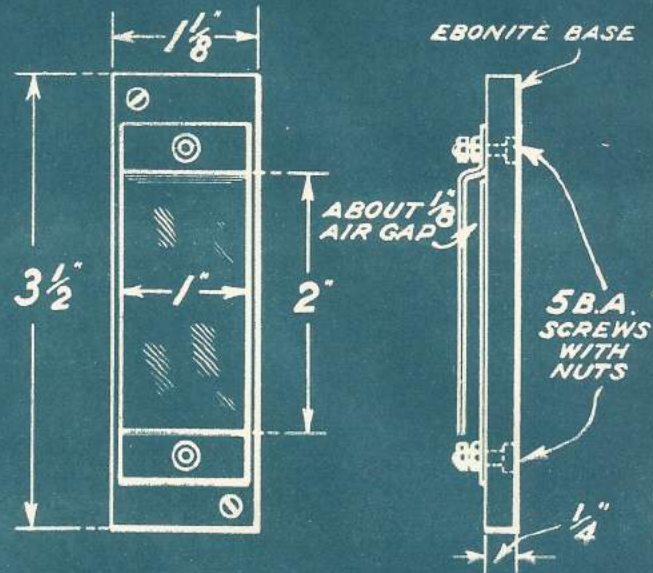
DRAWN BY *E.*

CHECKED BY *BRK*

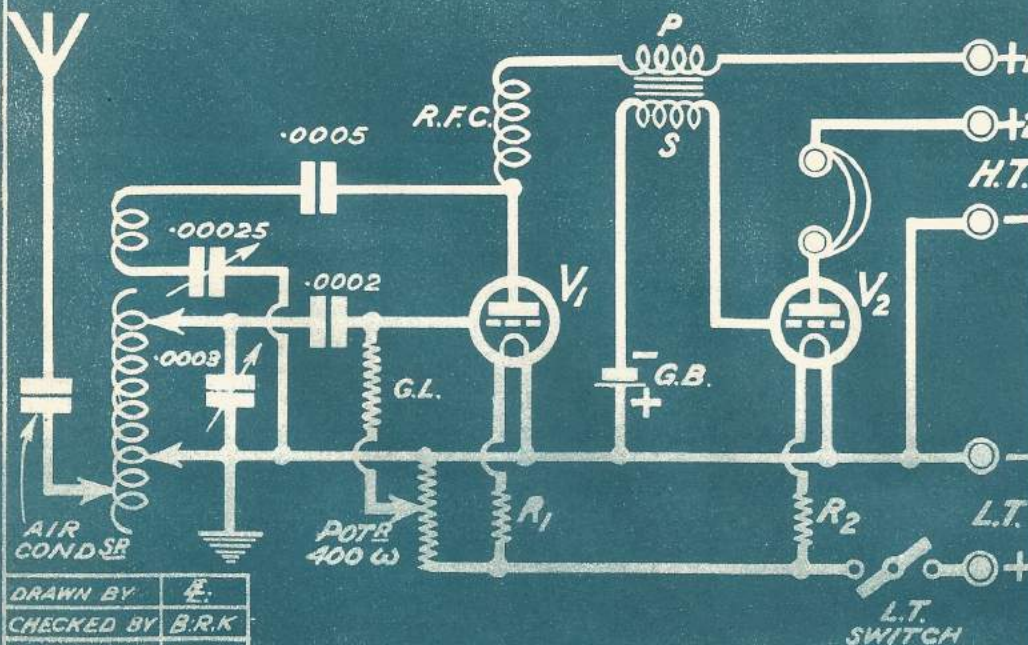
SERIAL NO *BP38A*

A two-valve L.F. amplifier with one resistance and one transformer-coupled stage. A simple amplifier capable of giving quality. Connect "input" terminals to 'phone terminals on receiving set. If results not satisfactory reverse these leads. terminals A1 and A2 together. Remember to connect L.T.- to earth with a crystal set. With a valve set and common connection to H.T.- on amplifier, but leave it free.

The "Sydney" Two



DETAILS OF FIXED AIR CONDENSER
IN SERIES WITH AERIAL LEAD.



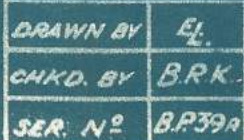
- 1 Panel, 14 in. x 7 in. x $\frac{1}{4}$ in.
- 1 Cabinet to fit, baseboard 10 in. deep and pair of brackets.
- 1 .0003 mfd. variable condenser, square law or S.I.F.F., with slow-motion or vernier drive.
- 1 .00025 mfd. miniature reaction condenser.
- 1 On-Off switch.
- 2 Baseboard rheostats to suit valves (usually about 6 ohms).
- 2 Sprung valve holders.
- 1 Grid leak and holder, 2 meg. upwards.
- 1 .0002 mfd. fixed condenser.
- 1 .0005 mfd. fixed condenser.
- 1 400-ohm. (200 will do) baseboard-mounting potentiometer.
- 1 L.F. transformer.
- 1 2-in. tube of any good insulating material, $3\frac{1}{2}$ in. long, for H.F. choke.
- 1 Piece of ribbed ebonite tube, 3 in. diameter and 3 in. long.
- 3 Tapping clips.
- 1 Terminal strip with 7 terminals.
- 1 Terminal strip with 2 terminals.

Various pieces of wood, copper sheet, ebonite, etc., for series condenser ("air") and coil mounting.

Small quantity of No. 34 S.S.C. wire for reaction coil and H.F. choke (75 turns on tube) and a few yards of No. 18 plain copper wire for coil.

1 Valve, H.F. type.
1 Valve, L.F. or power type.
H.T. and L.T. batteries to suit valves, pair of 'phones,
grid-bias battery.

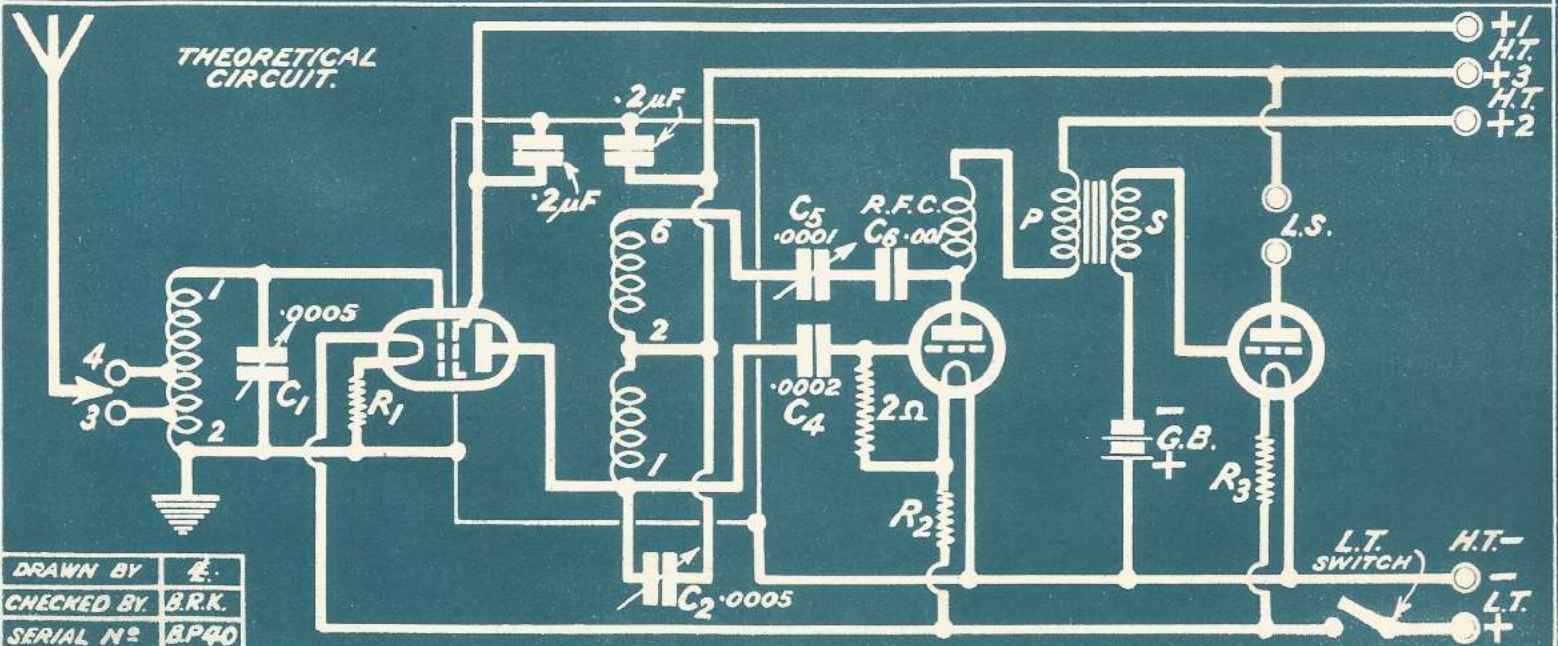
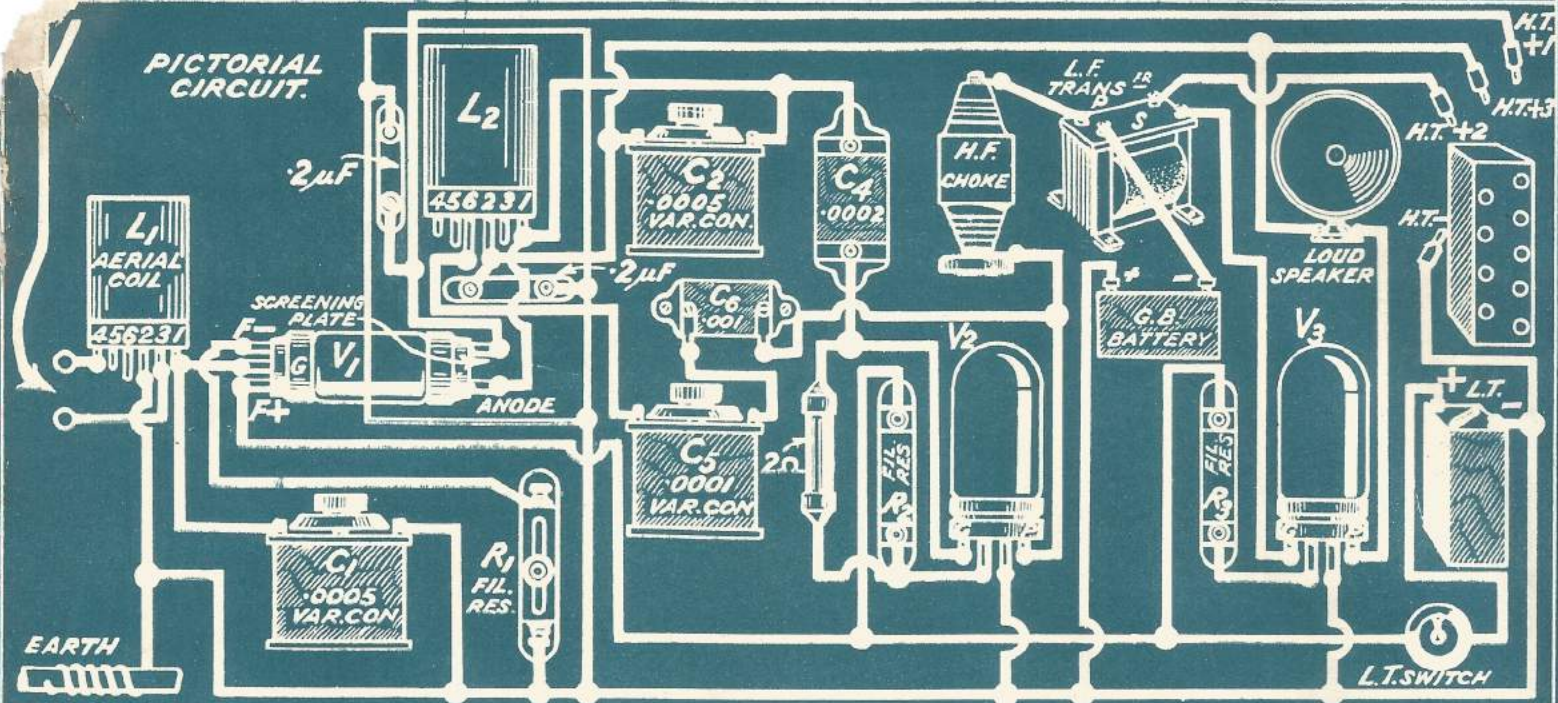
DRAWN BY	E.
CHECKED BY	B.R.K
SERIAL NO	BP39



A simple and efficient short-wave set tuning from about 18 metres to 70 metres. Tuning coil consists of 12 turns, with about $\frac{1}{8}$ in. spacing between turns. For details of mounting see drawing. Reaction coil consists of 7 turns of No. 34 S.S.C. wire on a little piece of tube to slip inside the tuning coil. Earth and grid clips control tuning range and aerial clip the degree of coupling to the aerial. For further details see "P.W." No. 284.

THE "P.W." BLUE PRINT CIRCUIT No. 40—

The "Super Screen" Three



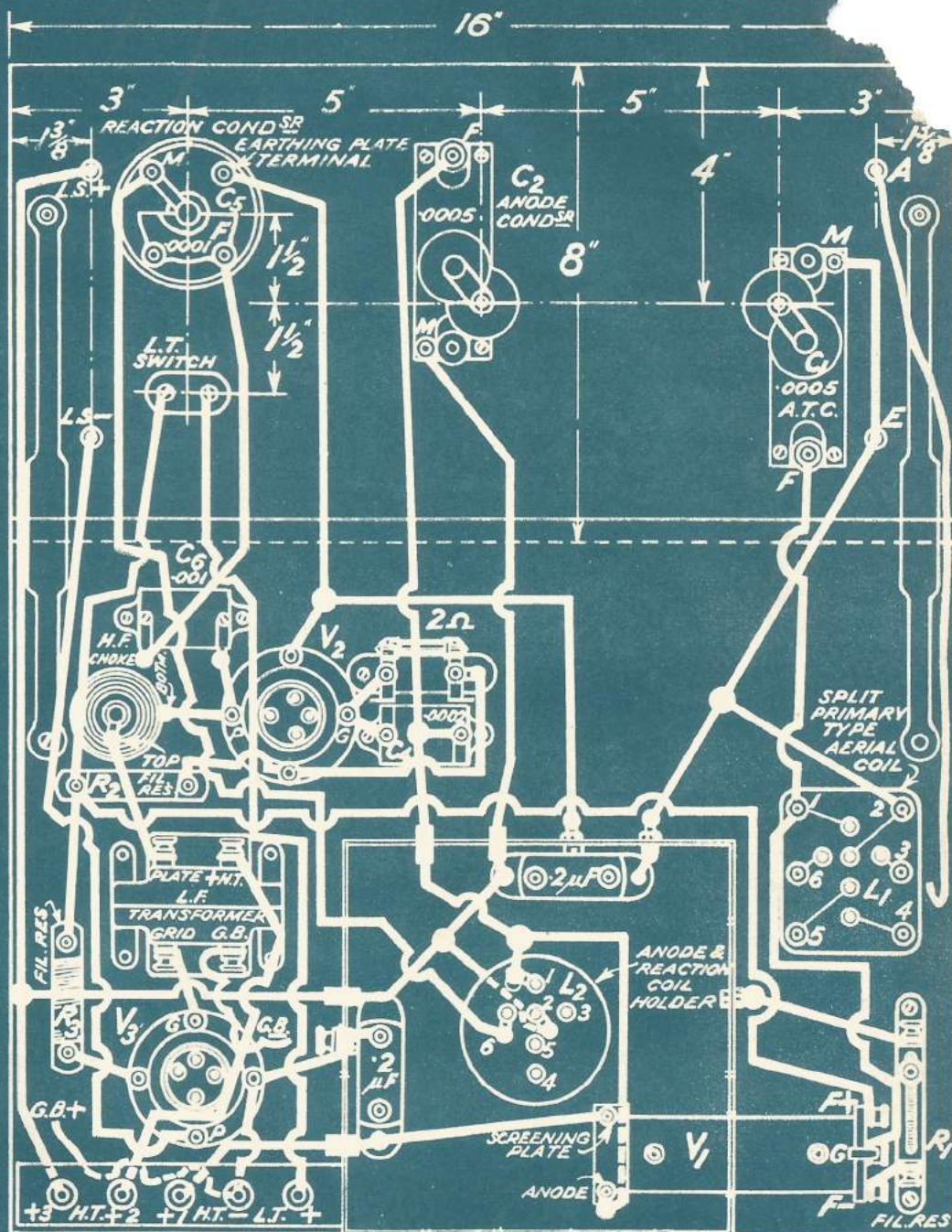
DRAWN BY	E.
CHECKED BY	B.R.K.
SERIAL N ^o	BP40

COMPONENTS

- 1 Panel, 16 in. \times 8 in. \times $\frac{1}{4}$ in.
 - 1 Cabinet to fit, with baseboard 12 in. deep, and brackets.
 - 2 .0005 mfd. variable condensers with slow-motion drive or vernier dials.
 - 1 .0001 mfd. miniature type reaction condenser.
 - 1 On-Off switch.
 - 1 H.F. choke.
 - 1 L.F. transformer, fairly low ratio.
 - 1 Standard screening box with 6-pin coll base, and hole cut in side for screened valve.
 - 1 Valve holder for screened-grid valve.
 - 2 .2 mfd. Mansbridge type condensers.
 - 1 6-pin base for aerial coil.
 - 3 Baseboard rheostats to suit valves.
 - 2 Sprung valve holders.
 - 1 .001 mfd. fixed condenser.
 - 1 .0002 mfd. fixed condenser.
 - 1 2-meg. grid leak.
 - 1 Terminal strip with 5 terminals.
 - 4 Terminals for panel.
- Quantity of wire, Systoflex, etc.

ACCESSORIES

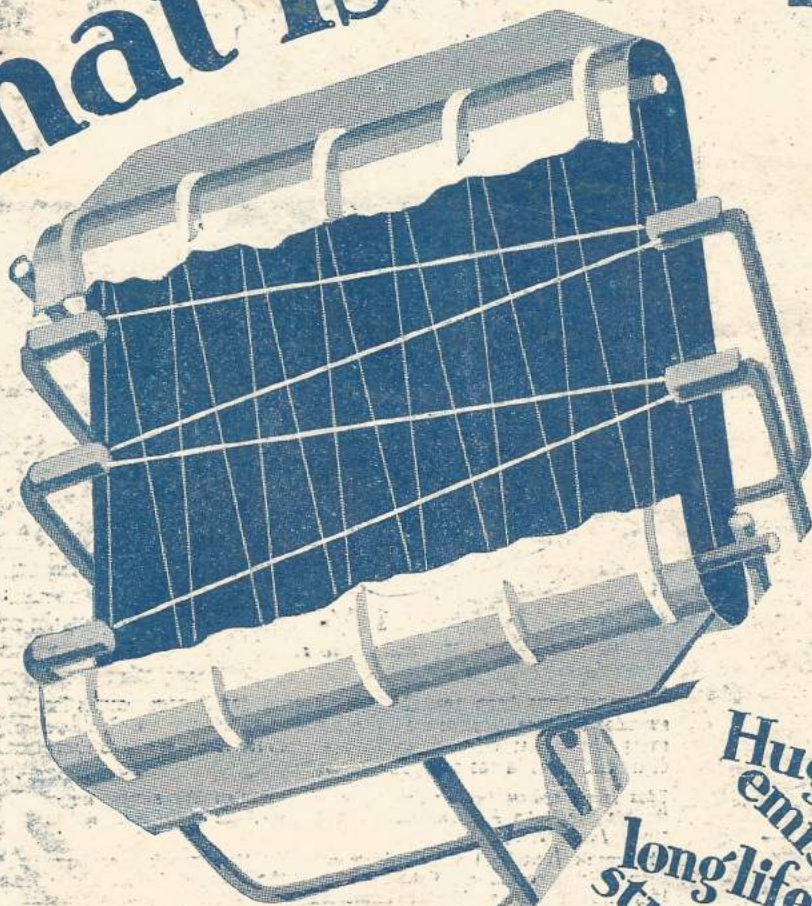
- 1 Screened-grid valve.
- 1 H.F. type valve for detector.
- 1 L.F. or power valve.
- H.T., L.T. and grid-bias batteries to suit valves.
- Phones or loud speaker.
- 2 "Split-primary" type aerial coils, one B.B.C. waves and one long waves.
- 1 Special anode coil on Colvern "Featherweight" former. Single layer of 55 turns No. 24 D.C.C. wire, lower end to pin No. 2 and upper to pin No. 1. Reaction winding in same direction of 30 turns No. 34 D.S.C. in single layer at lower end of former. Lower end to pin No. 6, upper end (and nearest to lower end of main coil) to pin No. 2 also.
- 1 Split-primary transformer for long waves, to be used in place of above for 5 X X, etc.



A highly sensitive long-range receiver with one stage of H.F. (screened-grid valve), detector, and one transformer-coupled L.F. stage. Will work a loud speaker on a large number of stations. Connect the flex lead from A to 3 or 4 on aerial coil base according to degree of selectivity required.

DRWN BY	E
CHKD BY	BRK
SER. N°	SP400

The Filament that is unique



Huge
emission
long life
strength &
improved
results

Mullard

THE · MASTER · VALVE

WITH THE WONDERFUL P.M. FILAMENT