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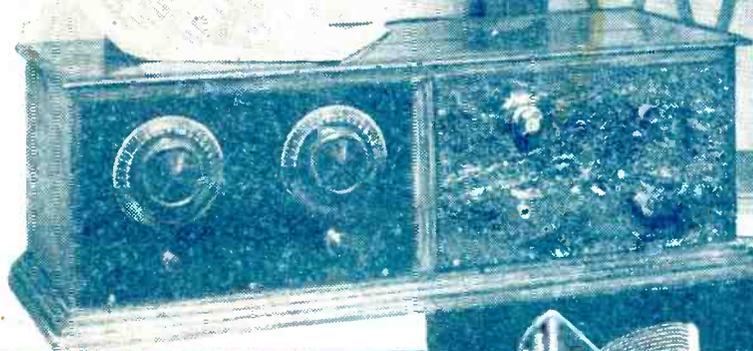
No. 427. Vol. XVII.

INCORPORATING "WIRELESS"

August 9th, 1930.

BUILD THE "A.P." TWO

*Described
Inside*



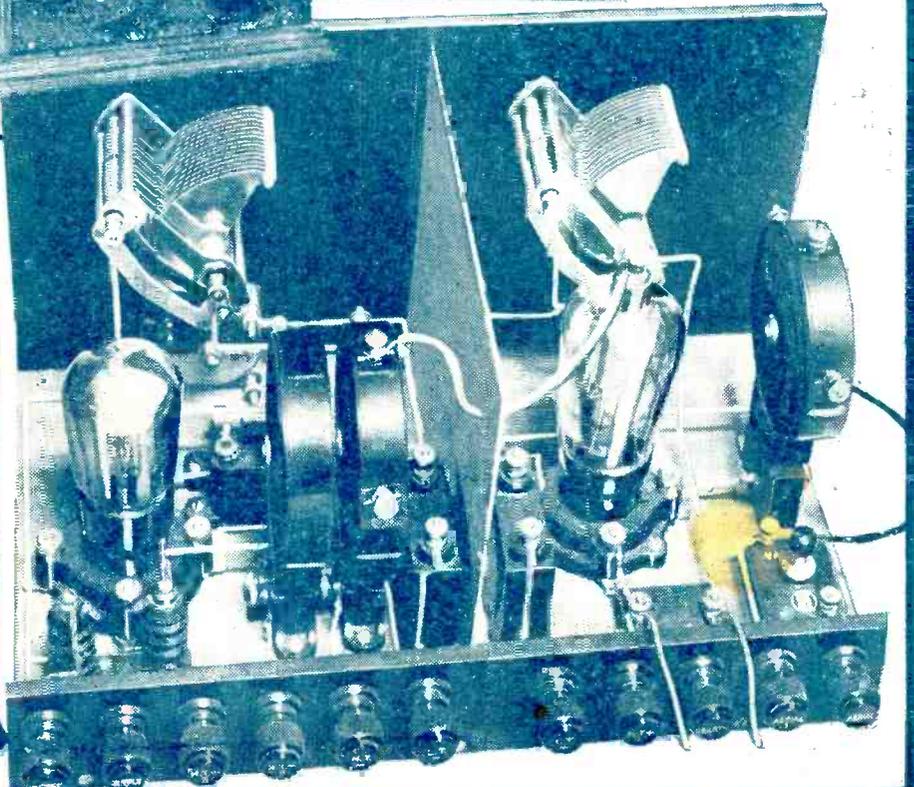
Special Features

CIRCUIT MISFITS
INCREASING YOUR SET'S
POWER

KING CAROL'S
BROADCASTER

THE
DRAMA & TELEVISION
By Capt. P. P. Eckersley,
M.I.E.E.

THE B.B.C. TO-DAY
A Further Intimate Peep into the
Inner Workings of the B.B.C.



VII

ON THE PEAK OF

Efficiency Quality Power & Value

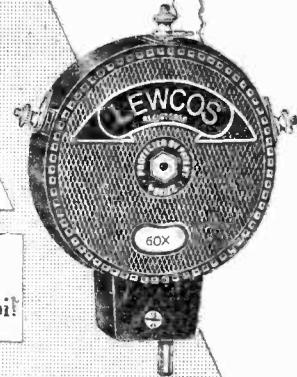
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Popular Wireless



Scientific Adviser :
 Sir OLIVER LODGE, F.R.S.
 Chief Radio Consultant :
 CAPT. P. P. ECKERSLEY, M.I.E.E.
 Editor : NORMAN EDWARDS.
 Technical Editor : G. V. DOWDING, Associate I.E.E.
 Assistant Technical Editors : K. D. ROGERS,
 P. R. BIRD, G. P. KENDALL, B.Sc.,
 A. JOHNSON RANDALL.



ONE POINT OF VIEW—
 WICKED WIRELESS—
 IT BRINGS THEM OUT—
 SEANCES BY RADIO—

RADIO NOTES & NEWS

THE UNSEEN INFLUENCE
 AN AERIAL TIP—
 THE B.B.C. ORCHESTRA—
 BROADCASTING HOUSE—

One Point of View.

A SPANISH woman sunning herself at Cheltenham—of all places. A little desultory talk. She reminded me of a great, sleepy pussycat. Presently the sound of an orchestra led us to speak of radio. "My osban," quoth the duchess, as who should say "My fan, my trifle." "My osban is an—how does it call itself?—*un affectionate* to r-radio, but for me, *zeñor*, all thatt zeem laike to take zer gild from zer budderfly's *ouing*. Verdad? I laike zer sun shine on my corpse and zer smells in my nose and to veel zer loafly ma-ter-i-ah-les with zer 'ands. All zis mean, I weesh to live wiss life and not next doors of her." Maybe, maybe! But we cannot all live slap up against realities, moddom!

The Empire of the Fair.

AND talking of women, isn't this year witnessing a mass attack upon the predominant position of men in achievements once purely heroic? Amy Johnson flips to the Antipodes and instead of alighting with a world gesture she just combs her hair. Another lady (who combines chicken-raising with sculpting!) goes and wins the King's Prize at Bisley! Etcetera! In ten years there will be nothing left for us to do except to huddle together in top back rooms and swap stories about radio circuits. But we shall still be useful for sharpening the carving-knife, taking nice out of traps, supplying money, and a few odds and ends like that!

Education by Radio.

INCREDIBLE! The B.B.C. announces that in the autumn it will take a referendum on educational broadcasts. You all know "Ariel's" views on school-time wasting with tin trumpets. What can have happened to have brought about the awful doubt at Savoy Hill? How determinedly, and with what a show of conferences and committees, the B.B.C. has pursued its notion that it can show school-teachers how to do their jobs! And now, having shot the pianist, the B.B.C. is going to make enquiries!

The Noise War.

PIQUED at the competition which traders' demonstration loudspeakers

are offering to their trams, buses, road-excavators, etc., town councils all over the land are passing by-laws prohibiting loud speakers in this place and that. In view of this, I was horrified to read that Siemens & Halske have produced a loud speaker which can be heard more than ten miles away. Fancy using this in London and incurring the penalty thereof in Sutton!

fundamentals of religion cannot be removed from the human make-up by any human agency.

Stamping It on the Mind.

STILL, propaganda can be very powerful if skilfully applied, and well the Germans know it; their radio propaganda during 1914-1918 gave me many a poisonous hour! However, "all that" being over now (bar the taxes, etc.), they are carrying on the work by printing on some of their stamps "Become a radio listener." Whether that is a command or an appeal I do not know, but I should think that many people would welcome in its stead some advice as to the best means of finding the money for a receiver.

It Brings Them Out.

THE Post Office "detector van" seems to be a very effective form of propaganda, not only on behalf of the B.B.C. but also on the side of law and order. While the van was investigating in the Newcastle district during April 29th-June 3rd, no less than 2,648 new licences were taken out, whereas during the corresponding period of 1929 only 450 were taken out. Similar figures concerning other Northern towns show a similar stimulus. You may make whatever inference you like from these facts.

Seances by Radio.

THE whole thing has fizzled out. It was nothing but a luncheon-table repartee. Mr. Fisk has now explained, says "Wireless Weekly" (Australia), that all he intended to convey was his opinion that any communication with the spirit world takes place through the ether. He doesn't know whether such communication can be effected or whether there is anybody to communicate with.

So that's that. Perhaps Mr. Fisk would next be good enough to explain why the above-mentioned paper refers to him as "one whose scientific practicality has made possible our Beam system and our British telephone system"—a very misleading statement—to say the least!

(Continued on next page.)

THE "BANZAI" BOYS!



These two cheering flag-waggers are the grandsons of Admiral Takarabe, Chief Japanese Delegate to the London Naval Conference, and it was his broadcast speech on his return to Japan that set them shouting "Banzai."

Wicked Wireless.

ISN'T it rather a pity that in Paris there had to be a campaign against "the perils of radio," during which daily prayers were offered in all the churches on Mont St. Michel? Back of it all, so the report reads, is the opinion that radio is an organ of anti-religious propaganda. So far as the B.B.C. is concerned radio has done nothing to harm religion and much to encourage it. Anyhow, a survey of the history of mankind from the Stone Age to last Tuesday forenoon convinces me that the

RADIO NOTES AND NEWS.

(Continued from previous page.)

"Earth" All Round Him.

SALUTATIONS to "E. P." of Weston Souvenir—I mean Super-Mare, and thanks for a letter full of interest. Apart from export packing-cases and the electrical room of a hospital, I have never before heard of a room being lined with lead. That is what they have done to "E. P.'s" room, but being a wireless enthusiast he seized the chance of using the lead sheets as a "counterpoise earth," and he says that the result is equal to his gas-pipe "earth." I should say that this instance is unique.

The Crystal Diehard.

HAVING an original and independent cast of mind, "E. P." has not slavishly followed the trend of fashion. He still uses an H.F. valve, followed by a crystal with plug-in coils. With this outfit he has received (on crystal alone) P C J, Paris, and Berlin, and most of the Continentals besides, when using the H.F. valve. For loudspeaker work he uses a separate two-valve amplifier, and he can make 5 X X work three loudspeakers together, with the crystal and amplifier. A useful outfit indeed, though I just cannot bring myself to feel any affection for crystals. Well, cheery-bye!

The Queen's Hall Broadcast.

THE first broadcast of this season's "Prom" concerts at Queen's Hall takes place on Saturday, and there is a fine all-round sort of programme to it! Further broadcasts of these concerts will be given on August 11th, 13th, 14th, 18th, 19th, 21st, 26th, 27th, and 29th (all on National), and August 12th, 15th, 16th, 20th, 22nd, 23rd, 25th, 28th, and 30th (on Regional). I have seen the whole season's programmes and shall not listen in. Oh, no! I shall go to the Queen's Hall. A little too much stressing of "new works" perhaps—there are twelve—but plenty of the good old stuff, too. Sir H. Wood, of course!

A Big Noise!

SOME of you may be interested to know the composition of this fine orchestra which is 114 players strong. Here goes! First violins, 20; second violins, 16; violas, 14; violoncellos, 12; double basses, 10; timpani, 2; percussion, 3; harps, 2; flutes, 4; oboes, 4; clarinets, 5; bassoons, 4; horns, 6; trumpets, 5; trombones, 5; tubas, 2. This lot can and will make a glorious noise. If you have never been to a "Prom" you have missed a great experience. The sweep of the bows, the glorious clangour of the brass, Sir Henry inspired and working like billy-o, the rapt audience—all these must be perceived and that can be done only by being present. Give them a try out!

How They Notice!

A TEACHER friend has shown me a boy's essay on "Wireless," written for the summer exams., of which the following portion is priceless: "It makes you know science if you didn't know much before; especially your parents. You often hear my dad arguing about battris with the baker's man, but he gets it mostly out of twopenny magazines and does not

really know it. Same as my mother talks about foreign stations, but could not tell where Nairobi was. When I asked her she said 'mother's busy.'"

The Unseen Influence.

FOR some years I have had my receiving outfit, including a large 6-volt accumulator, standing on a small table which some fastidious person covered with a cheap red cloth. I never charge the battery while it is on the table, nevertheless the cloth has faded to a feeble pink, and if handled roughly would fall to pieces. It is killed with acid. Somehow or other the fumes have crept out of the tiny vent-holes and in course of time done their work. An old ebonite panel seems to be better than a fancy cloth for supporting the battery.

An Aerial Tip.

I WAS shocked to read the news about that unfortunate man who fell whilst climbing his wireless mast and was killed. But why climb masts? Insist upon having a pulley on top of the mast,

SHORT WAVES.

The B.B.C., we read, is to broadcast country sounds. We feel sure that West End revellers will be pleased to have their dance band cut off in order to hear a chicken sneeze in Sussex.—"Humorist."

GIVING THEM THE BIRD.

An orchardist in the Harz Mountains has discovered that he can keep the birds away from his fruit by installing a powerful loud speaker among his trees and turning on the wireless.

It is not reported that the different items on the programme differ in their efficacy; but further investigation seems to be called for.—"Evening News."

It is reported in the "Daily Herald" that nine tomcats alone man a warship which, during operations, is controlled entirely by wireless.

There is no truth in the rumour, however, that the cats' whiskers are put to considerable use on these occasions.

ELECTRICITY MORE POPULAR.

We are approaching the volt-age.—"Daily Mirror."

THOSE RADIO TALKS.

Talk! Talk! Talk!
From some moth-eaten guy.
And Talk! Talk! Talk!
Of how we live and die.
It's oh! to be in the fashion
And have a gramophone,
Then, when weary, have something cheery,
Not a talk on the telephone.
"Daily Record & Mail."

so that the aerial can be lowered and raised without necessitating a climb. Another point! After, perhaps, a year of undisturbed peace the wire or rope may become stuck in the pulley; the wire will corrode or the rope will swell. Therefore, before the aerial is hauled up, fasten a stout string on the wire or rope, between the aerial insulator and the pulley. If the pulley sticks, a tug on the string (which should, of course, reach hand height) will put the matter O.K.

How Not to Repair Valves.

C. (Sheffield) asks me whether—as he has been advised by "some sort of an electrical engineer"—he can join together the filaments of his four burnt-

out valves" by placing the glass part in hot water over night." The answer is just plain "No." Why doesn't this "sort of an engineer" do it for you? Tell him from me that a better way of joining together the four filaments is to break the glass gently with a hammer made of boxwood—see that the grain runs E. to W., please!—extract the filaments with a sharp tug—on the left leg, mind!—and melt them up in a ladle after carefully removing any vacuum which may be clinging to them.

The B.B.C. Orchestra.

HAVING decided to form an orchestra of 112 players, to cost £100,000 per annum, the B.B.C. has the opportunity of creating one of the "world" orchestras, like the Philadelphia, Hallé and Vienna Philharmonic. Will they do it? Or will they hamper Dr. Adrian Boult with Civil Service-like regulations? "Musical Opinion" points out that the opportunity will be lost if the orchestra is allowed to be a dumping ground for inexperienced players. It recommends, also, the appointment of a permanent conductor of eminence. We live in hope!

New York Telephone.

IN a letter to "Radio Design," an American amateur radio organ, a South African complains that he gets the London New York radio telephone conversations down there. He says that they in S. Africa are supposed to be right out of the line. Why? Who said so? The Post Office used broadcast for the service! He suggests that the Marconi people would be interested to know "all this." I should be surprised if they don't know it, though I hope our friend does not imagine that they run the service. If they did, it would be conducted by Beam.

Broadcasting House.

THE latest news from the big hole in Portland Place indicates that on the foundations which were completed last winter there is steadily arising a builder's paradise of concrete and steel girders. The central tower, which will contain the studios, is beginning to look "like," whilst underground amongst the moles two studios have already been roughly completed. The B.B.C. states that a special system of artificial daylight illumination will be installed in order to avoid any feeling of depression amongst the staff. Nothing special has been planned to cope with depression amongst listeners!

The Post Office Licence.

BECAUSE the Postmaster-General has no statutory powers to compel the owners of electrical plant causing interference with radio reception to remove the cause of such interference, many people imagine that the licence for broadcasting has been issued under false pretences. Bless you, the P.M.G. issued licences long before broadcasting was thought of, and would continue to do so even if every B.B.C. station were disintegrated. All he licenses you to do is to install a wireless receiver, and the licence in no way commits him to provide broadcasting for you to hear; in fact, if you listened only to New York he would require his ten bob just the same.

ARIEL.



MY arrival back in London from a holiday was not characterised by any particular demonstrations; it seemed superficially that things were much the same as when I went away.

My set was still working, the B.B.C. was making much the same sort of noise, the "Radio Times" looked as much like a twopenny weekly as ever, and talked about much the same kind of things in much the same kind of way, my newspapers ranted and were quietly pessimistic or scathingly sarcastic about unemployment, without, however, proposing any real remedy

"Something Exciting and Original."

To one who loves new things, and enthusiasm, and change, and was bursting as usual to show how much better everything could be done, it all seemed discouraging.

But suddenly here, in my newspaper, there was something exciting and original. The "pick of the wireless programmes" showed, that, at 3.30 on Monday, there would be a television play. The play chosen for this daring experiment was "The Man with a Flower in his Mouth." "Well! Well!" I thought, "this must be seen."

"Doubtless the B.B.C. and the Baird Company have come together at long last and have made great improvements." (Because, of course, when I last saw television it was in too crude a state to give any kind of basis for dramatic representation.)

The Truth.

I had heard through a casual talk with a television enthusiast that "things were much better," and I was anxious to know whether this meant that the B.B.C. were now more impressed with television, or that the rumoured recent reorganisation of the Baird Company was implied in "things," or that simply television had really improved.

So I rang up and arranged, and found myself (a minute or two late, it is true) peering anxiously into that small elusive swaying square (two inches by three inches, I think) and listening to a rather poor quality voice which must have been intended to go with the play.

Our Chief Radio Consultant witnessed the recent television play broadcast, and here gives readers of "Popular Wireless" his opinions.

My prejudices, as some would describe my realistic statements, are well known. Perhaps since I am nearly always right my essential fair-mindedness is not always appreciated.

I therefore assure my readers I have nothing against anyone in the Television Company, and believe the members of the staff to be honest, hard-working and en-

I am trying to be funny at the expense of serious pioneering. You will be wrong. I am trying to give you a description in terms of my emotions when I saw the affair.

As my eyes grew accustomed to the light, I saw first what I afterwards labelled as the linoleum effect. In the gently swaying image far back in the depths of the television box one saw in the 2-in. by 3-in. aperture, just a number of squares dark and light like a chess board.

The First Picture.

These supervened, as it were, from right to left. Whenever the linoleum appeared it seemed as if there was bad cross-talk in the control room, because a whiff of unrelated music stole around me. Then

as the music died the linoleum moved leftwards, revealing what I took to be an aerial view of Paris accompanied by a guide's vocal description—what looked like the clear flat ribbon of the Seine and the curious fungoid out of focus of the bordering buildings was romantically blurred but quite recognisable.

I Guess Wrong.

My guess that I was seeing an aerial view of Paris showed itself to be wide of the mark however, due to the super-imposition of a bunch of bananas enfolding an active cataclysm.

Unable to restrain a mixture of amusement and curiosity, I dem-

anded of those who stood near, the meaning of it all. They told me it was a circular marble-topped table, a glass of liquid, and a pair of hands!

No sooner enlightened than denied; my "Paris" was obscured by the drifting patchwork cloud and music called my vision-fixed attention to my ears again.

(Continued on page 583.)

BEFORE THE TELEVISOR.



The three actors in the first television broadcast play. Note the "scenery" on the left.

thusiastic. I count many in the B.B.C. my friends; my sole object in describing what I saw, where another might remain silent, is to tell the facts to those who have never seen television or a television play and believe it to be something worth while.

The incredible truth! The always incredible truth! You will, perhaps, think

MORE ABOUT THE A.C. "SAFEPOWER."

Some further details of the A.C. mains unit described last week.
By THE "P.W." RESEARCH DEPT.

THE reader will by now have got a general idea of the design and use of the unit, so next let us look over the circuit and see how it all works in a general kind of way, without going too far into technicalities. You will note first of all that we have used in this particular unit a full-wave type of rectifying valve, whereas the standard A.C. unit only employs a half-wave rectifier.

It does not follow, by the way, that there is anything inferior about the half-wave valve or superior about the full-wave, because, strictly speaking, that is not the case. It is chiefly a matter of practical expediency concerned with the amount of actual current required.

Full- or Half-Wave ?

The point is that the full-wave type of rectifying valve costs rather more than the half-wave type, and so it is customary to use it only when considerable current output may be required. The smaller half-wave type now available in many makes has the advantage of relative cheapness, and so it is commonly employed for those smaller types of units intended to give currents of, say, 20 to 25 milliamps, such as our standard A.C. model.

The smoothing filter consists of our usual double or cascade arrangement made up of the condensers C_1 , C_2 , and C_3 , and the two L.F. chokes. The condensers C_4 and C_5 also add a little extra smoothing to their respective output points, although this is not their main function, which latter is rather a matter of the prevention of coupling defects inside the unit. The net result is a particularly pure and well-smoothed output which should be sufficiently free from hum to satisfy the most critical.

The general idea of the methods adopted for the prevention of motor-boating and similar objectionable effects, and the scheme for voltage control and adjustment, we have already explained in some detail, and it just remains to point out that the main control of voltage, which we have referred to in passing as being given by the resistance R_1 , actually takes the form of a series variable resistance placed at a suitable point in the main feed circuit.

The Power Transformer.

The power supply part of the circuit you will find to the right-hand side of the circuit diagram, and you will observe the two plates of the rectifier valve are connected to the two extreme ends of the high-tension secondary winding in the transformer, the centre tap of this winding providing the H.T. — point. The filament of the valve is lighted from a small winding on the transformer which is also centre tapped, this tap providing the positive side of the H.T. circuit.

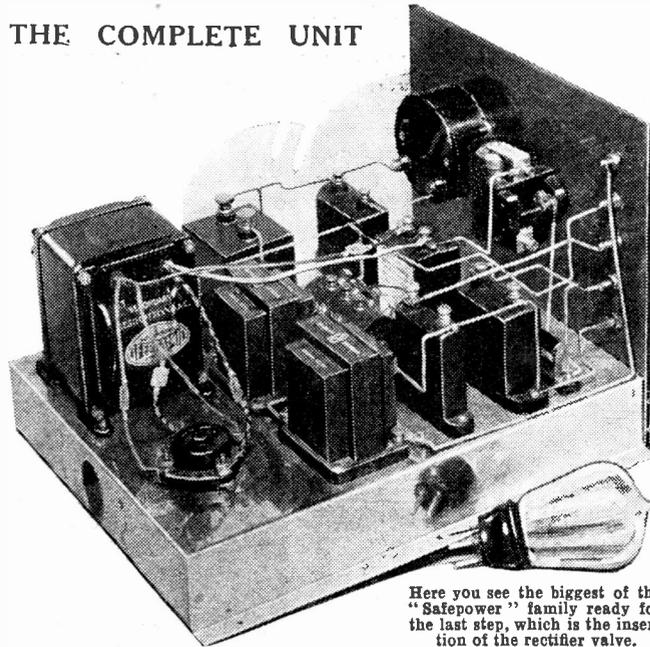
Now there are some constructional and practical points with which we must deal. The power transformer first calls for

attention, and it is to be understood that what is required here is a component with first of all a low-tension secondary winding giving 5 to 6 volts, and provided with a centre tap. This is for lighting the filament of the rectifying valve.

Next you require a centre-tapped high-tension winding, which should have a rating of either 200-0-200 or 250-0-250 volts. These are the two commonly available ratings, and either will do, since they both give a rather higher voltage than you require, and the normal procedure is to work with the resistance R_1 set back so that you only get the desired reading on the voltmeter.

The particular transformer which we have employed has no terminals, but instead a number of different coloured leads emerge from its casing and upon each of

THE COMPLETE UNIT



Here you see the biggest of the "SafePower" family ready for the last step, which is the insertion of the rectifier valve.

these you will find a small tag marked to agree with the lettering on the circuits and wiring diagrams.

In other makes you may find that terminals are provided, but you should have no difficulty in following out the connections with the aid of the notes we have given.

The primary of this transformer—i.e. the mains winding, is to be connected to the usual adapter which you will find fixed under the base portion of the "SafePower" chassis. The particular transformer we employed has a stout twin flex lead coming out from the casing, and intended for connection to the mains, and this should be cut down to a suitable length, taken down through a hole in the metal base, and so to the adapter, to which its two ends should be connected in the usual way.

The various condensers should be of 250 volts "working" rating or higher, the figure quoted being the minimum for safety. In the majority of makes this means you must obtain the special mains type, although it should be noted that in the case of Lissen condensers the standard receiving type are guaranteed to stand this voltage, and some of these were actually used in the original unit.

An Important Point.

Before we proceed to consider certain wiring points there is just one other practical matter which should be mentioned. You will observe that the socket for the rectifier valve is mounted directly upon the metal base, and you should examine your valve socket to see that none of the metal parts underneath can possibly come into contact with the metal when it is screwed down. This is a possibility with some makes of holders, and if there seems to be a risk of it with your particular specimen, place under it, before screwing down, a small piece of Empire cloth or other good insulating material.

Now, there are just two wiring points to be mentioned. First note that connections are made to the actual metal of the base itself at two points, and you must be careful not to forget these. One is in the neighbourhood of the condenser C_1 , one of whose terminals is wired down to the head of a screw which secures it to the base.

The other is an exactly similar connection from one side of the condenser C_4 . Our second point is just to explain that the lead marked "mains input" from the transformer is the primary lead already mentioned, which goes down through a hole in the base to the mains connector adapter, mounted underneath.

This adapter, by the way, you will find is already fitted to the base when you purchase it.

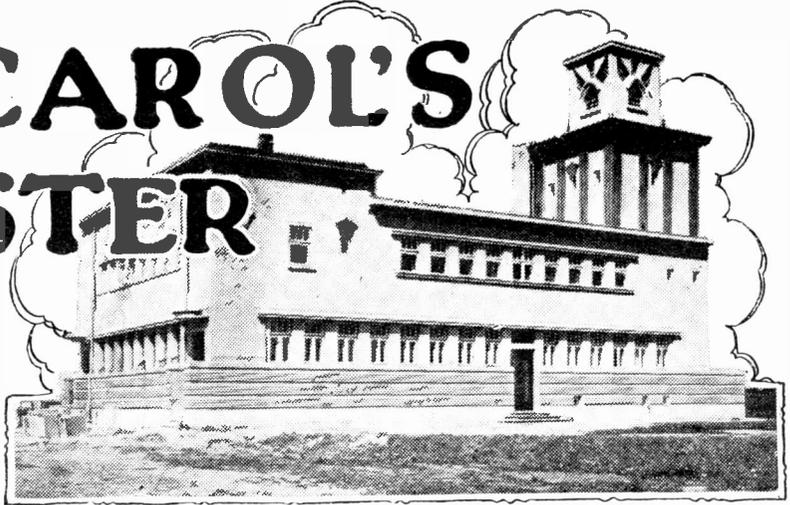
Quite Straightforward.

All the rest of the work is quite straight-

forward, and you will have no difficulty in following it out with the aid of the diagrams and photographs. All the various components on the base are fixed in position with small brass screws and nuts, the necessary holes in the base being drilled very easily, since the metal used for it is extremely soft.

There we can leave you, but we must not do so before issuing our usual warning, and that is that this is an instrument for working upon the mains, and therefore it is up to you to be careful to make a really sound job of it with good joints, carefully insulated wires, and so on. Remember that this unit is probably going to last you for some years, and if you want reliable service you must put care into its construction as well as good components.

KING CAROL'S BROADCASTER



In view of the recent coup d'etat by Prince Carol of Rumania this account of the Bucharest station should prove of particular interest.

From our
SPECIAL CORRESPONDENT.

WHILE the daily papers were making a fuss recently about the love affairs of King Carol of Rumania, I frequently tuned-in Bucharest (which comes in well, thanks to its 12 kilowatts) and heard first-hand reports of the revolution in the capital.

Probably not many listeners in this country realise that Bucharest is the capital of Rumania. It was mere chance that, being in Belgrade a short time ago, I decided to take the boat and train trip to see Bucharest's transmitter, which I had heard from the Marconi people before leaving England was one of the best 12 kilowatts in action in the European ether.

An Amazing City.

It is a pity that Rumania is off the beaten track of tourists, who will go to the Black Forest to see the Rhine, but will not cover the extra miles to see the Danube.

Bucharest itself is an amazing city, and the hotel in which I stayed, under the radio "shadow" of Radio-Bucharest, was as good as many in London. The Rumanians are homely folk, mostly engaged in agriculture, and it is strange to connect their tastes with the many American jazz bands and several cinemas featuring transatlantic talkies, which grace the night life of the capital.

But that is apart from radio. I got into conversation with the manager of the hotel, and he told me that there are no radio licences in Rumania, and that the Rumanian Broadcasting Company, which is having rather a rough time just now with all this political upheaval, derives its revenue from advertising.

I was told by the manager that this advertising is quite well done, and is not too blatant, but having only a *patois* knowledge of the language I could not judge for myself. There is certainly a lot of "talk" in the programmes.

How Bucharest Began.

From an R.B.C. advert. in a local Bucharest paper I found the address of the Rumanian Broadcasting Company's offices, and I dropped in to get official sanction for a *viza* of the station, taking my credentials from the Marconi people; but there wasn't any difficulty about getting a pass, because the R.B.C. is short of funds, and is glad to see anyone who might be interested.

So that evening we (an R.B.C. engineer and I) set out for the transmitter house,

a photograph of which you see here: a weird style of architecture, and like many of the modern buildings in Bucharest.

There we met one of the station staff, and he, an "old hand," explained how the first Bucharest station had started in 1925—almost an amateur station run by a group of bright lads of the Bucharest University, under the director, Prof. Hurmuzescu, himself a keen radio enthusiast.

They put up a 100-watt set, and the good results they obtained, due largely to the favourable locality, caused listeners' interest to grow in Bucharest so that they clamoured for a proper service and a big station.

I asked how it was possible to put up so large a station without proper funds, and I was told, in contradiction to what the hotel manager had said, that subscriptions (equal to about 15s. per set) are invited

Instead of a piezo crystal, which I was told is difficult to work in such outfits, there is a rather complicated master-oscillator circuit. Listening, back in England, I dare say you have noticed that while Bucharest is often heterodyned, its own wave length is remarkably constant.

At Bucharest they are very enthusiastic about their aerial. We went out to look at it—supported on tall, slender, stately lattice pillars (with narrow parallel sides, and not sloping out at the bottom like the Eiffel Tower) and with a host of guy wires.

Five Miles Out.

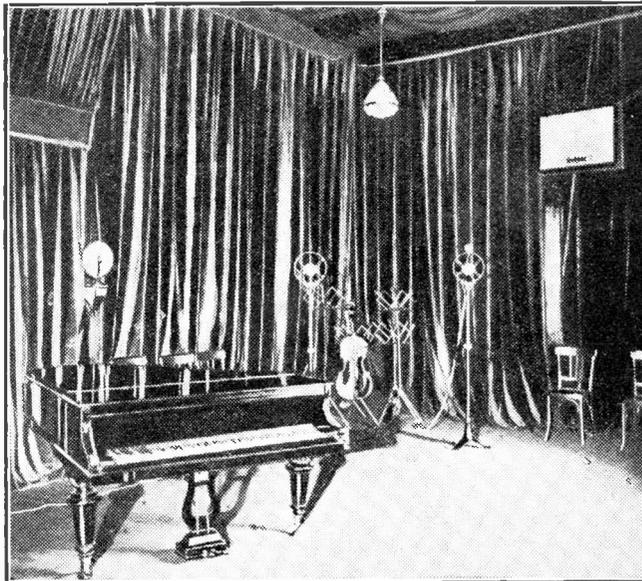
The transmitter is five miles out of Bucharest, on level, open ground. On that fine evening the view was grand, and it was obvious why the radio waves have so free a path. The big buildings of the city are not near enough to cause absorption.

We went back to the studio, and in one of the intervals I was introduced to the lady announcer, whose silvery tones you can often hear.

We were in the large studio, a lofty, heavily-draped room which a B.B.C. man would regard in horror, and there were three microphones on stands. One was used for the piano, and the others were placed here and there in the studio for the soloists and a small band.

I saw the metronome which gives the interval signal, and I saw the gramophone on which I suppose they now again play the Anthem at the close of the evening, the organ and choir record of "Traiscea Regale."

RUMANIA'S RADIO



The main studio at the Bucharest broadcasting station. The transmitter can be heard in England most evenings on 394 metres, and uses 12 kilowatts.

from listeners, and the Post Office collects these fees. But there are many pirates, and the P.O. takes a huge percentage for its trouble of collecting the money.

The transmitter itself is very little different from the many other Marconi plants I have seen at foreign stations, and it is not crystal controlled.

Jolly Programme.

There was a jolly programme, and we were allowed to stay in the main studio until the end of the evening.

Then, at the close-down, the fair announcer switched on her microphone and, in embracing tones bade listeners "Buna seara tuturor."

LATEST BROADCASTING NEWS.

5 X X PERMANENT

**AUTUMN RADIO DRAMA—
NEW SCOTTISH TRANSMITTER;
A HITCH—"THE MAN FRAE
INVERSNECHY" — "DIPS"
FROM FUTURE PROGRAMMES
—FOLK SONG BROADCAST.**

THE long-wave National transmitter at Daventry, the old 5 X X, is NOT to be closed down when the regional scheme is completed. (The statement that it is to eventually disappear was first published in a technical journal (not POPULAR WIRELESS), and naturally caused great alarm to thousands of listeners who still rely on the "Big Bloke" for their wireless fare.) The B.B.C. has stated officially that the idea of closing down 5 X X is not and never has been contemplated.

Autumn Radio Drama.

The productions department at Savoy Hill, under Mr. Val Gielgud, is making plans for several outstanding broadcasts during the autumn. Among the plays which it is definitely decided to give is Mr. John Galsworthy's great industrial drama, "Strife," considered by many playgoers to be an even more arresting play than this author's other and perhaps better-known plays, "Justice," "Loyalties," or "Escape."

Mr. Galsworthy has given special permission for the microphone performance of "Strife," and it is more than likely that some novelty will be introduced in connection with the broadcast by giving representative opinions of the performance by leading industrialists and trade union speakers.

Several revivals of successful radio plays will also be included in the autumn programmes, among them being "R.U.R.," which lends itself so admirably to mechanical sound effects; "Beggars on Horseback," a satire on American habits and customs; and also that famous melodrama, "The Silver King." Arrangements are also being made to give a radio version of Shakespeare's "A Winter Tale."

New Scottish Transmitter: A Hitch.

Just when it seemed that a site for Scotland's new Regional transmitters had been found near Falkirk, a hitch occurred which will delay purchase, at any rate for a few weeks.

It is all a question of subsoil. Apparently these regional transmitters must be erected on either pure clay, gravel, or sand, and test holes for Scotland's "Brookmans Park" revealed the presence of a mixed soil which would be unsuitable for the foundations.

From one hole clay and gravel was extracted, while from another pure sand was obtained. Now more holes are to be dug to ascertain whether these mixtures are isolated streaks. If they are not a new story will have to be written.

"The Man Frae Inversnechy."

Scottish broadcasting officials lay great store on public opinion; that is to say,

they take a lot more notice of what their listeners and the newspapers say about the programmes than do their opposite numbers at Savoy Hill.

Just at the moment they are very bucked with what has been said about the relays of Harry Gordon's Concert Party entertainment from the Beach Pavilion, Aberdeen. So much so that these relays are already dubbed as the most popular Scottish programmes of the year.

"The man frae Inversnechy," as Harry Gordon calls himself, has long been a great favourite in Aberdeen, and now the whole of Scotland is so enthusiastic about his show that negotiations are going on for him to make more microphone appearances, both as a single turn in the near future and with his concert party at Aberdeen next summer!

"Dips" from Future Programmes.

Another relay from the Kursaal at Ostend is promised for listeners to the National programme on Sunday evening, August 31st. Further details of this concert will be given in our next issue.

HIS GOOD TURN—OF THE DIALS!

This happy group of Surrey Scouts are enjoying a musical interlude provided by the scoutmaster's set and loudspeaker.

FOR THE LISTENER.

By "PHILEMON"

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

Holidays.

SOMEWHERE in Italy. It sounds rather like the old days when it was always "somewhere in France." I wish you could be here with me for your August holiday, though I don't know how I should put you all up!

I am afraid that the fireflies and the nightingales have gone, but there are still the bullfrogs and the cicadas under the yellow moon; and you can buy a basket of peaches for a shilling, and bathe all day, and get either browned or blistered according to taste! Shorts and a shirt, that's all.

The Long and the Short of It.

You could also help me with the wireless. I am a fool with machinery.

I find it very odd that I can get any

Folk Song Broadcast.

Old Welsh songs, as they were sung long ago at village fairs in Glamorganshire, will be heard by West Regional listeners on Tuesday, August 19th, during a talk by Mr. John Devonald, conductor of the Kymric Oriana Choir. Mr. Devonald will describe how these songs were sung to harp accompaniment, and in the singing of them he will have the assistance of Mr. Tom Davies, a harpist.

In olden times practically every public house in Glamorganshire had its own harper—the word is correct—whose job it was to keep customers merry, to make them sing and dance.

Some of these harpers were very famous, and many will be referred to by Mr. Devonald in his talk. Among them is Mr. James James, who composed the music of "Hen Wlad fy Nhadau," the Welsh National Anthem; while his father wrote the words. A memorial to these composers has just been erected at Pontypridd.

A Running Commentary.

A continuous running commentary on the Ulster Tourist Trophy Race, from its start to finish, will be broadcast on Saturday, August 23rd, for listeners to the Belfast station. National listeners will also hear a description of the race between 3.30 and 5.15 p.m., when the proceedings are expected to reach their most thrilling stage.

The race takes place at the Ards Circuit, a course of about fourteen miles which is considered almost ideal for a road race, since it contains easy bends, bends which are more acute, as well as right-angle turns and "hairpins" demanding skill and iron nerve on the part of drivers.

number of stations on the short (medium) wave, but devil a one on the long wave. I expected just the opposite. I imagined I should get Radio-Paris more easily than Toulouse, and Hilversum than Langenberg.

I can, for instance, get the National Programme, from England on the 261 metre wave-length, and the London Regional on 556, but not so much as a squeak on the "Daventry 1554." Why is it? I do not know.

"Belinda" has five valves and 100 ft. of aerial. I have supposed that it is because I am staying at a place on the lake which is rather tucked-up underneath the Italian Alps, and perhaps the long wave goes over my head while the short comes trickling down the hillsides.

(Continued on page 602.)

THE B.B.C. TODAY

BY THE EDITOR



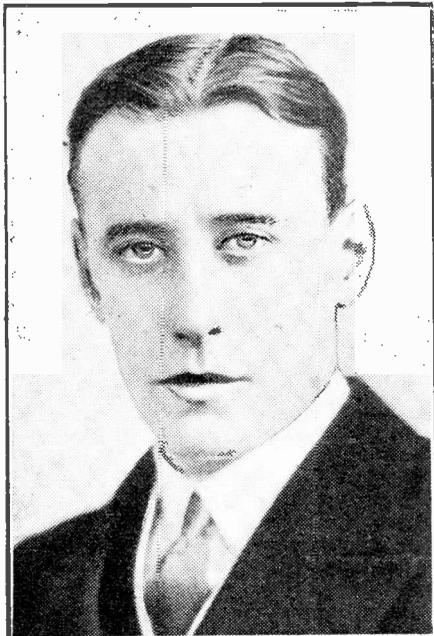
I WOULD begin this critical article with the simple but true statement that no organisation or agency so far recorded, either here or elsewhere, has placed as much good music within reach of the general public as has the B.B.C.

Staggering Figures.

The facts are staggering. A friend of mine in the Programme Department of the B.B.C. has been doing some statistical research. Amongst other things he has discovered that, counting each station separately from the beginning, the B.B.C. has broadcast over 400,000 hours of music, apart from jazz, up to the end of June.

This means 16,666 days, or practically forty-five years. Apparently even now, with far fewer stations than formerly, about 65,000 hours of music other than jazz is transmitted in a year; this means about seven and a quarter years of music,

BIRMINGHAM'S CONDUCTOR



Leslie Heward, the young conductor who has been appointed permanent conductor of the Birmingham Orchestra.

In this third article of a new series of intimate close-ups of the present policies and activities of the B.B.C., the subject of broadcast music is reviewed.

mostly good, transmitted in twelve months.

Certainly the most gigantic and beneficial enterprise of the kind ever undertaken or even conceived. Therefore when there is a change in the music directorship of the B.B.C. the event is of very great importance.

Dr. Adrian Boult was formally invested with his new job at Savoy Hill some three months ago, but he had been practically in charge since the beginning of the year. His predecessor, Mr. Percy Pitt, had played a noble pioneering part in securing serious recognition for the B.B.C., and in placing its programmes on their high original basis.

Mr. Pitt's great international reputation and his encyclopaedic knowledge of opera were of inestimable advantage to the B.B.C. Dr. Boult took over a going concern; but one which was ready for his particular contribution, which can be best assessed by considering his personality and character.

The National Orchestra.

Dr. Boult is a notable conductor but, fortunately for the B.B.C. not an outstanding one. I say this advisedly, because the music directorship at Savoy Hill requires primarily a well-ordered and business-like mind supported, of course, by wide knowledge and catholic appreciation. It seems to me that Dr. Boult combines just these qualities.

The chief task of the new Music Director is, of course, the new orchestra. Last autumn the B.B.C. made an arrangement with Sir Thomas Beecham which presumed a permanent partnership in evolving the National Orchestra. There was to be a trial season, out of which would emerge "the finest orchestra in the world" to quote a statement attributed to Sir Thomas.

But this partnership was ill-fated. First of all Sir Thomas was unable to carry out his conducting commitments to the B.B.C. At least one reason, if not the determining

one, was that he disapproved of the methods of the music department at Savoy Hill. The breach widened until now there is no hope of this partnership ever maturing.

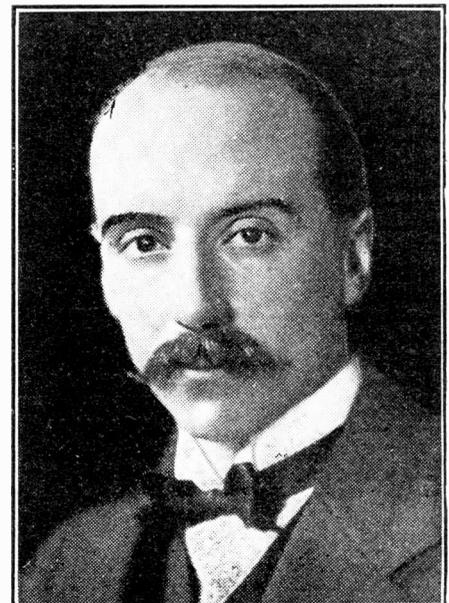
Incidentally the trial season was a heavy loss, and Sir Thomas stands to lose his part of the guarantee. So where Sir Thomas left off in the orchestra scheme, Dr. Boult takes over. I understand that about sixty-five of the contracts have been issued and signed; this leaves about fifty vacancies.

Deadlock Avoided.

There was danger of a serious dispute with the Musicians' Union over the pay, the latter body holding out for £12 12s. 0d. a week instead of the £11 11s. 0d. offered by the B.B.C. When a deadlock seemed inevitable, Sir John Reith made one of his inimitable interventions with the result that the Union gave way, and all is now amicable in that quarter. The delays and difficulties of the last season probably will impose another experimental season, and I would not be surprised to hear that

(Continued on next page.)

B.B.C.'s MUSIC CHIEF



Dr. Adrian Boult, musical director of the B.B.C.

THE B.B.C. TO-DAY

(Continued from previous page.)

the orchestra is not completed before the autumn of 1931.

Nearly a year has gone by since I offered some comments and suggestions which I thought might be acted upon appropriately by the new Music Director of the B.B.C. I said then that there was need to curb the appetites of the exponents of the cause of alleged "modern music"; which to 99 per cent of the listening public is nothing more than objectionable noise. I am gratified to note that my suggestion was taken into account.

Too Much "Vocal."

There is now much less of this "caviare to the general." But there is still too much. The B.B.C. should leave over its minority appeal music until the Regional Scheme is finished. Then it may be possible to cater for the negligibly few without exasperating the ordinary decent citizen.

The next point I would make about B.B.C. music is that there is still rather too much vocal included. Many otherwise excellent orchestral concerts are spoilt by the singers. For one thing the deficiencies of vocal soloists appear to be magnified by the medium; for another thing, it is not necessary or inevitable that all orchestral concerts should have a soprano or a tenor in every second item. I commend this to Dr. Boult's early attention.

And my next point has to do with real alternatives. This is admittedly a difficult subject, rendered not any easier by limited available material. But there has been a marked tendency lately to make the contrasts a bit thin. I have heard, for instance, "light orchestral" put on as contrast to "military bands," and there was an actual coincidence of the same musical number, both, curiously enough, including soloists but with slightly different scoring. Either light orchestral or military band is a good alternative to a symphony or to vaudeville; but not to each other.

The Birmingham Orchestra.

It is important that the splendid cheeriness of Joseph Lewis' Midland orchestra should be retained for British broadcasting whatever happens to the orchestra at Birmingham. The Saturday evening popular sing-songs from 5 G B have been the delight of millions up and down the country far out of the normal range of the Midland transmitter.

It seems pretty certain that there will not be a Midland Wireless Orchestra after the end of September. All the more reason that some special measures should be taken to preserve and foster "Joe" Lewis' splendid tradition. London is always in danger of becoming over-formalised; Joe Lewis will see to this on the musical side if he is given half a chance.

Is the B.B.C. doing all it can for British composers? This is a matter which can safely be left in the hands of Dr. Boult, whose record in this respect is one he may be proud of. I am sure he will see to it

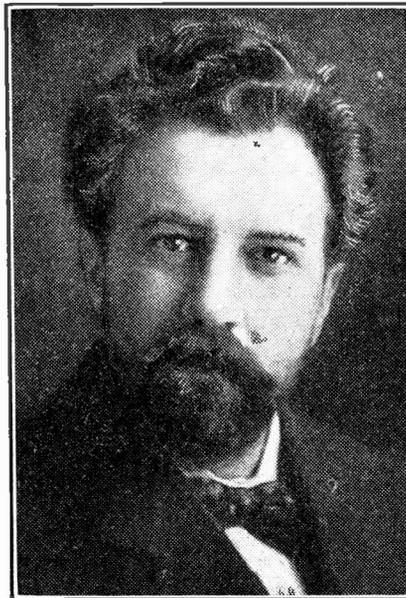
that those who put the programmes together always have in mind the British product, given, of course, "quality for quality."

With regard to opera I think the B.B.C. would be well-advised to abandon all studio productions. These served their purpose in introducing opera to the masses, sometimes in potted form. Now that a great public appreciative of opera has been created largely through the influence of the B.B.C. the time has come to broadcast only from actual performances in theatres and concert halls.

I understand that there is some prospect of the B.B.C. linking up with the new opera merger being sponsored by the Covent Garden interests. Whether or not this is so, the B.B.C. can get outside fully as much opera as should be broadcast.

Let us hope that when the Bach Cantatas have run out in 1932 there will not be any other long series to follow. It was an

FOR THE "PROMS."



Sir Henry Wood, who will again conduct the Queen's Hall Promenade Concerts.

excellent "stunt" to take on a programme feature to run every Sunday for three years at the same time. But the stunt value has long since expired, and there remains only acute and widening indignation. Leave them out for a year and then consider afresh.

The reference to the Bach Cantatas reminds me that the enrichment in popular appeal of the Sunday programmes in general is overdue, and perhaps Dr. Boult may be able to provide some impetus from his angle.

DRAMA & TELEVISION.

(Continued from page 583)

Before I could anchor myself to something firm in the sea of my bewilderment the linoleum slides silently back revealing—stop me!—the upper portions of a monkey, 2 in. by 3 in. True as I live, a monkey!

I swear it, a monkey with a Newgate fringe, black at the roots, haloed in orange, a monkey with a cleft palate and a shocking concentrated frown, a swaying monkey,

half-length only. "Moo-ow-oo-moo," went the voice, and occasionally eclipsing bananas floated dimly before the picture, obscuring the terrible mockery of that face.

And all the time fresh instalments of the monkey's body swaying up from below; orange clouds exposed as it sank rhythmically down. And only a head and shoulders always seen—and the mooring sound.

Was this the deepest symbolism? Mr. Lawrence de G. Gibbon Sieveking is known to be a modern artist, the play itself is macabre in the extreme and concerns, if my mind serves me, a man haunted by a filthy disease.

Horrid Symbolism?

Did the B.B.C. fear to show an actual man and so by subtle symbolism throw on the screen this simian disguise? And the bananas and the swaying up and down; as if the rest of the body, which we were denied, were seated in some arboreal throne swayed by the gentle winds of synchronisation?

And dare I suggest that the curious leprous effect of the edges of the figure, that growth-like cheese effect as seen beneath a teeming microscope, was all this part of horrid symbolism?

The monkey vanishes again just as I thought he must have hurt his head bumping against the roof of the screen.

But let him bump out of sight, there are fresh instalments following him up and down; one has a vision of a tribe of loyal swayers, each ready to take the other's place. The red flower in his mouth? If, as is rumoured, we were seeing a real actor, I judge from sight and sound it was better described as the monkey with the plum in its mouth!

It's all rather terrible. How sane people can put this kind of stuff over the ether, how the B.B.C. can allow itself to be party to it, makes me amazed. I believe, and have believed always, in speaking out about such things.

Call it experimental, call it what you like, the putting the announcement of a television play in the paper must deceive the public into believing that they are to see something not very inferior to the talkies. The public should not be so deceived. The worst of it is that very few members of the public saw the representation. I write as I have done for those who did not.

Wrong Methods.

I have written, in fact, in order that readers of the article may judge—albeit at second-hand—of the progress made in—is it two or three years?—the *Art of Television!*

In the end, let me clearly state that my point of view about television is that it can never have service value when applied through the medium of typical modern broadcasting stations. In America the problem is being rightly tackled, using wave-lengths and methods in conformity with its technical necessities.

Let the Baird Company leave the B.B.C. out of it and start real experimenting with their own stations. I wish them luck if they would do that, but they will need more than my wishes even then.

It is not that I would discourage their efforts, it is that public service does not enter the question at all to-day.

CIRCUIT MISFITS



THERE is room for considerable difference of opinion as to the relative merits of grid-leak and anode-bend rectification. For instance, the former is admittedly more sensitive to weak signals, though it may be responsible for a certain amount of distortion and damping of the high-frequency circuits, owing to the flow of grid current.

On the other hand, for high-grade reproduction from the local station, many listeners will vote in favour of anode-bend rectification, whilst admitting that it is less sensitive for distant work and more subject to fading.

When such important differences as these can be argued about, it is easy to see how hard it is to be pedantic about details, but the following hints will be a useful guide in avoiding circuit "misfits" on the high-frequency side of the receiver.

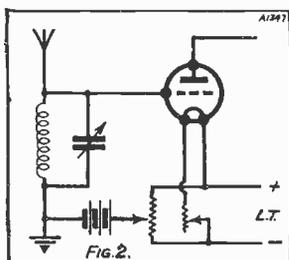
H.F. Stages.

When using a modern screened-grid valve as a high-frequency amplifier, it is better practice to use either a tuned-anode circuit or a one-to-one transformer coupling than it is to aim at getting voltage step-up from, say, a four-to-one transformer.

The impedance of the tuned-anode circuit can be made as high as the valve impedance, by using a low-loss coil and by accurate tuning. The same applies to a one-to-one transformer, especially if the secondary is tuned, since in this case the transformer is practically equivalent to the tuned-anode arrangement.

On the other hand, in the case of a four-

ANODE BEND BIAS



A potentiometer is useful for obtaining the best anode-bend results.

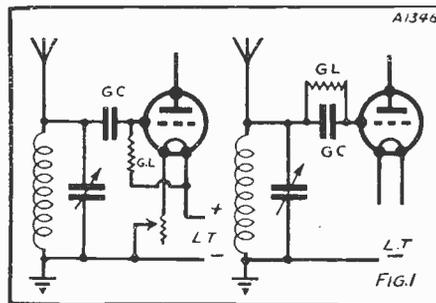
to retain the step-up advantage of the transformer, and at the same time to match the impedance of a modern S.G. valve.

In many of the older sets, step-up transformers gave satisfactory results, because the internal impedance of the older types of valve was considerably lower than those now being used. The same applies to neutrodyne valves of comparatively low impedance.

It is on the small things in radio, as much as the larger points, that success depends. Make sure these little factors are properly looked after in your set.
By J. C. JEVONS.

Such an arrangement might, for instance, work well enough with an ordinary or neutrodyne valve rated in tens of thousands of ohms, but there would be a distinct falling-off should this valve be replaced by a screened-grid amplifier rated at hundreds of thousands of ohms. In this event it

THE GRID-LEAK CONNECTIONS



Results may be spoiled by connecting the "far" end of the grid leak to the wrong L.T. lead.

is better to replace the step-up transformer either by a one-to-one type or by a tuned-anode coupling.

Another type of circuit "misfit" that one sometimes sees must be attributed to a certain lack of perspective as regards damping losses. For instance, it is quite common to find elaborately-wound low-loss coils on the high-frequency side followed by a leaky-grid detector. The damping introduced into the high-frequency circuits by the grid leak in such a set far outweighs any advantage gained by using Litz wire and careful spacing on the coil formers.

Transformer or Resistance?

On the low-frequency side the principle of matched impedances is a valuable guide, though here the conditions are modified by the fact that the valves used have a low internal resistance.

The detector valve (fed from the H.F. side) is voltage-operated, whereas the loud-speaker (fed from the L.F. stages) must be supplied with adequate energy if satisfactory reproduction is to be secured. For a given H.T. the available energy depends

upon the amount of current flowing through in the plate circuit, which in turn necessitates a low valve resistance.

In these circumstances, it becomes practicable to use a step-up transformer coupling having an effective impedance substantially equal to that of the valve, and thereby to take advantage of the extra amplification due to the voltage gain.

With two stages of L.F. it is common practice to use one choke or resistance coupling followed by one transformer coupling. It would usually be a "misfit" to reverse this order, and to insert the transformer-coupled stage in front of the resistance or choke-coupled stage, particularly in mains-driven sets.

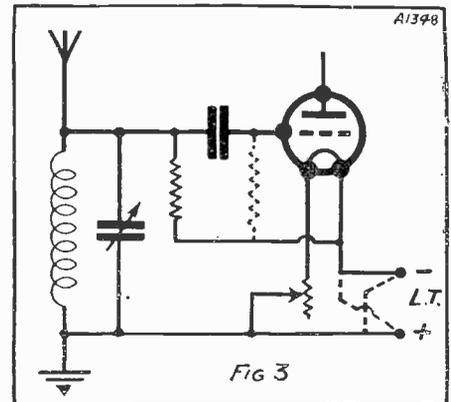
An L.F. Hint.

The reason is that if there is any hum or extraneous "noise" present, this will obviously be emphasised more if it is first stepped-up by the transformer and then amplified by both valves, than if the transformer is so placed that it only feeds the last stage of L.F. amplification.

Finally, it is easy for the most careful constructor to make an occasional slip in assembling a receiver from a selected kit of component parts. There have been many instances where the whole effect of an otherwise admirable piece of work has been spoiled by the apparently simple error of connecting the leak resistance to the far side, instead of to the grid side, of the blocking condenser.

The result of the incorrect connection is, of course, to insulate the grid so that it rapidly builds up a high negative charge which completely paralyzes operation.

REVERSING L.T. POLARITY



The whole effect of a good piece of work can be spoiled by connecting the grid leak to the wrong side of the blocking condenser, or by reversing the connections to the L.T. Battery.

SHORT-WAVE NOTES.

A discussion of the effect of atmospheric conditions on the Heavyside layer, and of other matters of interest to the short-wave enthusiast.

By W. L. S.

TAKEN from the radio amateur's standpoint, there is no doubt that 1930 can be classed as a "black year"; and it is interesting to note that it has been a very unfortunate and troubled year from several other points of view. I refer to the disturbances in Japan, the recent terrible earthquake in Italy, the flooding in Yorkshire and the thoroughly abnormal weather conditions both here and in France for July.

There must be some connection between terrestrial conditions, atmospheric disturbances and radio reception, and probably another half-dozen years like this (though not consecutively, please!) might furnish sufficient data to begin to work something out.

Earthquake Effects.

I was interested to see, on the authority of a meteorologist and scientist, that, after a severe earthquake shock, the distribution of barometric pressure, particularly between Europe and America, may be upset for some years.

Looking at it from the pure tyro's point of view, knowing nothing whatever about matters meteorological, it seems feasible to me that a great mass of light volcanic dust suddenly puffed up to the upper atmosphere might easily upset the whole scheme of reflection of radio waves.

We are told that after the great eruption of Krakatoa in 1883 the upper layers of the atmosphere were abnormal for a long time, and that wonderful sunset effects prevailed for a year or more. Possibly similar conditions may arise after an earthquake such as has taken place this year.

There is, at all events, an obvious chance for the better-equipped radio laboratories to make an attempt at getting nearer to the solution of what might be called the one big remaining problem.

Trouble on 20 Metres.

The angle of reflection for the 20-metre amateur wave-length still seems to be all wrong, and many of the London "hams" with whom I am acquainted have trekked back to 40 metres, on which wave they are working telephony with locals! If one can't get the thrill of real DX it is better to talk to the man in the next street than let the transmitter become buried in cobwebs!

A new station has appeared in the 24-metre region, and I have to thank three or four readers for pointing him out to me. I refer to G 2 G L of the "Homeric." Up to date he has only been heard working with E A Q of Madrid.

"R. C. A." reports this station, and asks queries regarding F K I L M, V Q 3 M S N and V R I A. F K I L M is a Kenya station using the old prefix and should now, I believe, be V Q 4 L M A. V Q 3 M S N is an amateur station in

Tanganyika, but V R I A has me beaten completely. "R. C. A." says that one can log American amateurs on the 40-metre band if one doesn't mind sitting up till 3 or 4 a.m. The trouble is that I do!

New Short-Wave Broadcasters.

"E. H." reports the arrival of a Norwegian broadcast station on about 31 metres, and also finds Sydney coming over extra well. He also mentions Rome on 80 metres, all over the house on the loud-speaker.

Several readers also query the station P X M G, calling amateurs on the 20-metre band. To the best of my knowledge this is a boundary expedition in Brazil. Several Britishers have been in touch and at one time the location was given as Malu River.

Another new short-wave broadcast hails from Belgrade, Serbia, on about 31 metres,

whom is getting short-wave broadcast all over the house on the loud speaker while the other can't hear anything, even on 'phones. But it is so common that I am quite used to hearing about it.

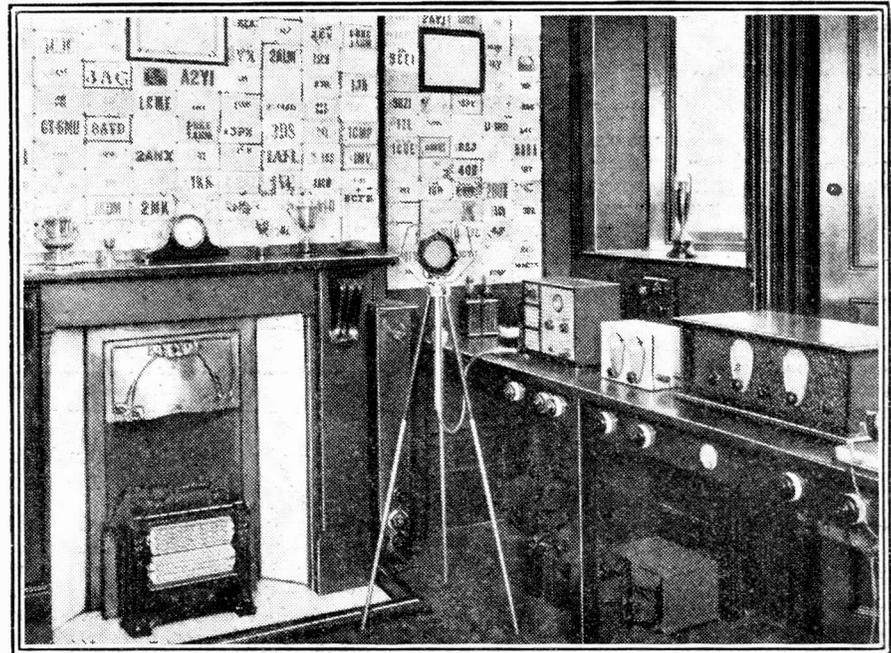
Where do the "duds" go wrong? None is keener to know that than they themselves! I think the only generality that helps is that they are simply too careless all round. They don't think it worth while to take pains over this and that, until the total amount of pains not taken is great enough to act as a protective blanket against the entry of any signal into their 'phones!

I have come across the same with amateur transmitters. Given power for power, it is nearly always the man with the neat, well-laid-out station that bags the records. The old axiom that an untidy set works best, true as it was when it was acknowledged, does not apply to short-wave work. "The difference between tidiness and "sloppiness," may be the difference between good results and nothing at all.

What Will Happen?

As I write this I am viewing with fear and trepidation the arrival of a new metal box in which I have to build my own short-waver, which has now grown untidy enough to cause rude comment among my

FIRST AMATEUR TO WORK ALL CONTINENTS



This neat-looking amateur transmitting station G 5 B Y belongs to Mr. O'Heffernan, who was the first to gain the "Worked all Continents" certificate issued by the International Amateur Radio Union.

and is reported the usual R 9, "full loud-speaker strength all over the house" by those readers who have got him at all.

Good and Bad Results.

Incidentally, this is characteristic of short-wave receivers; at any rate, those owned by "P.W." readers who are sufficiently interested to write to me and pour out their troubles. Apparently "when they are good they are very, very good, but when they are bad, they are—"

It is very strange to think of two people with sets built to the same design, one of

friends, who never fail to inform me that I don't practise what I preach, when they have the chance.

At present I have my detector and L.F. in a small metal box, with the S.G. stage outside. I now have to build the whole thing in the one box; I object to it on principle because it works so well as it is! But probably it will work better still when the cobwebs have been swept away once more. Incidentally, I hope to make it possible to use A.C. or D.C. valves at will, and will pass on next week anything I have found out on the subject.

AS soon as we set to work to design this little receiver we discovered that we had taken on a peculiarly difficult job, which will probably strike you as strange when you have had a look at the photographs and noticed how extremely simple the instrument is. As a matter of fact, it was just in that very simplicity that the greater part of the difficulty was encountered, as you will see when we explain how it all began.

Extending the Range.

Well, it started when we decided that our readers would probably like to have a design for a companion receiver to use with the "A.P." Amplifier which we described in a recent issue.

The idea was that this amplifier would probably be constructed by many readers possessing a single-valve receiver and desiring to progress to loud-speaker reception, and that once they had discovered the pleasures of receiving foreign stations upon the loud speaker, they would probably desire to extend the range and power of their outfit still further.

Special Requirements.

The "A.P." Amplifier, in conjunction with any good single valve receiver, should bring in quite a number of foreign stations upon the loud speaker, but there is always the feeling that an efficient H.F. stage would bring them in still better, at greater volume and with improved quality; further, that

it would bring in still more foreigners which were out of reach with the single-valve arrangement.

Hence, we concluded that these constructors of the amplifier would be pretty sure, sooner or later, to wish they could employ with it a slightly more powerful receiving set; in other words, an instrument with a screened-grid H.F. stage and detector in place of their single-valve instrument.

So far, so good, but when we came to think out the requirements in a little receiver for this purpose we soon realised that they were distinctly unusual—and, in fact, that something quite out of the ordinary was required.

In the first place, then is the question of economy. Obviously, anybody who is making this change will be scrapping a single-valve receiver which has in the past no doubt given him good service, and he will wish to make the change as economically as possible.

Evidently, then, a very strict eye must be kept upon the question of cost in making

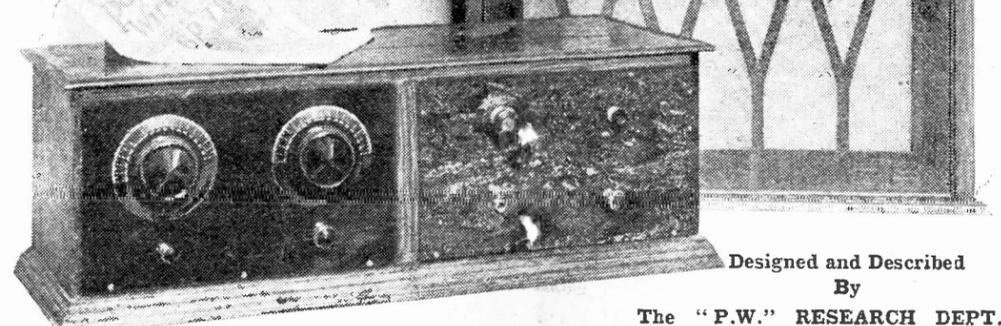
the "H.F. and Det." unit, and a still closer watch upon the types of components used.

These must obviously be, as far as possible, perfectly standard ones, so that almost all the parts in the existing single-valve receiver can be used over again in the H.F. and detector unit. Again, it is quite likely that an outfit of this sort will appeal to the man who likes to do a certain amount of experimental work, trying out different circuits, and so on.

It is a particularly convenient form of installation for such constructors, because to try out any new receiving circuit all that is required is to build up just the H.F. and detector portion of it and then to hitch this up to the existing amplifier and proceed to put it through its tests.

In the course of such work it is quite possible that some time in the future an arrangement will be tried out which seems to be more attractive than the existing receiver unit, which latter would presumably thereupon be

THE "A.P." TWO



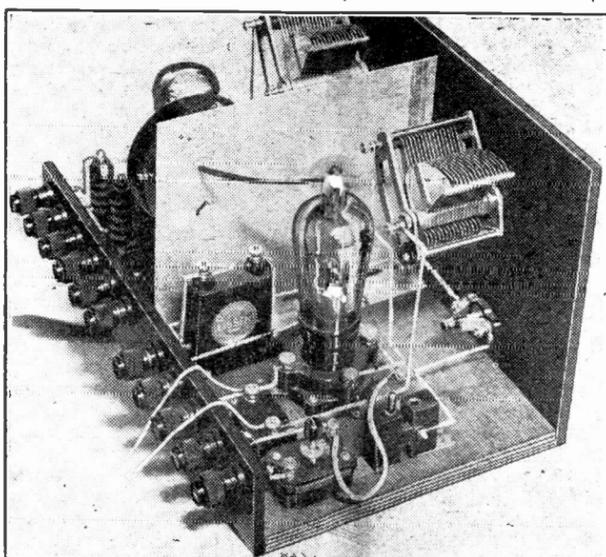
Designed and Described By
The "P.W." RESEARCH DEPT.

Here is a companion unit to the "A.P." Amplifier, described in our issue for July 12th. The "A.P." Two is a really efficient screened-grid and detector receiver, capable of bringing in distant stations with remarkable strength. Add it to the amplifier (in one cabinet as shown above if desired), and you have a powerful four-valver of first-class quality and exceptional sensitivity.

THE PARTS YOU WILL REQUIRE.

- 1 Panel, 12 in. x 7 in., or 12 in. x 8 in. (Lissen, or Paxolin, Goltone, Trolite, etc.).
- 1 Cabinet with baseboard 7 in. deep to fit.
- 2 .0005-mfd. variable condensers (Ready Radio, or Lissen, J.B., Polar, Lotus, Ormond, etc.).
- 1 .0001-, .00013-, or .00015-mfd. differential reaction condenser (Lotus, or Ormond, Lissen, Polar, Dubilier, Ready Radio, Wearite, etc.).
- 1 L.T. switch (Ormond, or Lissen, Benjamin, Igranic, Lotus, Red Diamond, Bulgin, etc.).
- 1 .001-mfd. (max.) compression type condenser (R.F. or Formo, Leweos, Lissen Polar, etc.).
- 3 Single coil holders (Wearite and Lissen or Red Diamond, Lotus, Igranic, etc.).
- 2 Valve holders (Igranic, or W.B., Benjamin, Lotus, Bulgin, Wearite, etc.).
- 1 .01-mfd. fixed condenser (T.C.C., or Dubilier, Lissen, Ediswan, Mullard, etc.).
- 2 1-mfd. fixed condensers (Lissen, or Dubilier, Mullard, T.C.C., etc.).
- 1 .0003-mfd. fixed condenser (T.C.C., or Ediswan, Lissen, Ferranti, Mullard, Dubilier, Atlas, Igranic, etc.).
- 1 2-meg. grid leak and holder (Dubilier, or Lissen, Igranic, Ediswan, Mullard, Ferranti, etc.).
- 1 H.F. choke (Watmel, or Varley, Ready Radio, Lissen, R.I., Dubilier, Leweos, Lotus, Wearite, Bulgin, etc.).
- 11 Terminals (Belling & Lee, or Eelex, Igranic, etc.).
- 1 standard "P.W." screen 7 in. x 6 in. (Magnum, or Paroussi, Wearite, Ready Radio, etc.).
- 1 Terminal strip, 12 in. x 2 in. Wire, flex, screws, etc.

IDEAL FOR LONG-RANGE RECEPTION



Brings all
Europe
To Your
Home

Continental
Stations
Sound Like
Locals

EASY TO BUILD

The H.F. end of the set. The spacing of the components is an important feature of the design and in your copy of the set you should follow the arrangement given as closely as possible. The grid-bias leads for the S.G. valve are shown coming over the terminal strip.

EASY TO WORK

scrapped and a permanent version of the new arrangement built. To feel free to do so the constructor must not have tied up a great many components in his standard receiver, and, again, they should be of types likely to come in useful in the new unit.

Simple and Compact.

On top of all these limitations, it was taken for granted that the design should be of the highest possible efficiency, to be in keeping with the high standard set by the "A.P." amplifier. It must be of excellent selectivity, and be a real "distance-getter." Taking it all round, you will see that to produce a design which would fill the bill was quite an undertaking, and indeed we actually spent a good deal more time upon it than we have upon many larger sets.

If you will now take a look over the various diagrams and photographs, we think you will agree that we have managed to turn out a set which does actually meet the case. You will observe that it is exceedingly simple, compact, and easy to make, while the circuit diagram will show you that it gives every promise of an excellent performance, a promise which we can assure you was amply fulfilled by its behaviour on test.

Few New Parts.

You will see, further, that every component is of a standard and universally useful nature. Moreover, you can work into it practically every part which came out of your single valve instrument.

In a modern single-valver, for example, you will almost certainly have a differential reaction condenser and certainly a .0005-mfd. tuning condenser, an on-off switch, a valve holder, a grid

condenser and leak, and an H.F. choke, quite probably also some single coil sockets. All of these can be incorporated in the receiver we are going to describe, and so only leave you a few extra parts to buy.

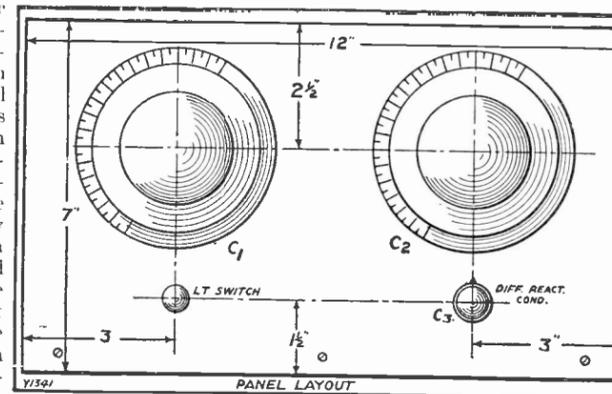
Now let us take a look over the set more in detail and see how all this has been managed. The most convenient point of reference here is the circuit diagram, and your first glance at this will show you that we were not far wrong in claiming exceptional simplicity for this little receiver.

First of all observe that standard plug-in "X" coils are used for the aerial and tuned

secondary circuits, and for the inter-valve coupling circuit. This latter is of the "tapped tuned anode" variety, and the use of an "X" coil here enables a very good compromise to be achieved between a amplification on the one hand and selectivity on the other.

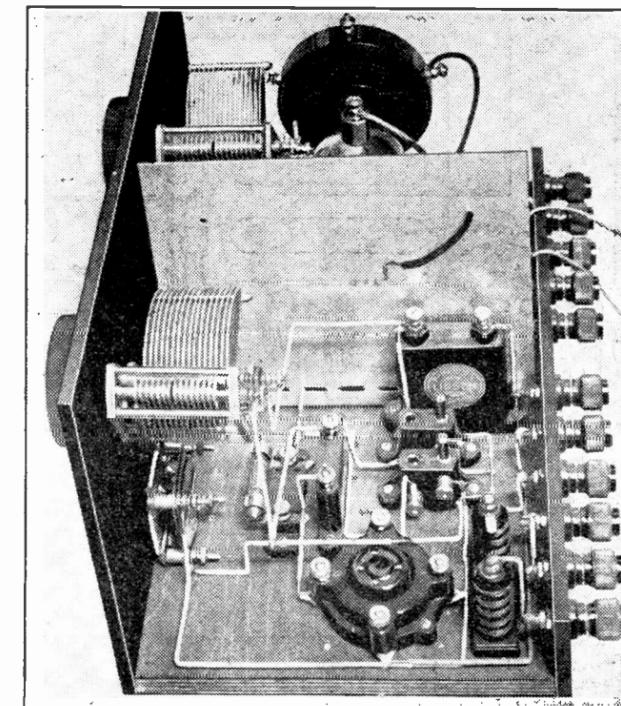
The aerial coupling and secondary tuning arrangements which form the grid circuit of the

SYMMETRICAL DESIGN



The panel layout is neat and symmetrical. On the left is the aerial tuning control and on the right the dial belonging to the tuned anode circuit. Below this dial is the reaction control, the remaining knob being that of the L.T. on-off switch.

SMOOTH REACTION—EFFICIENT DETECTION



Differential reaction enables the most efficient type of reaction control to be obtained, while the "X" coil used for the tuned anode provides a high degree of selectivity. Note the careful screening between the H.F. input and output circuits of the screened-grid valve.

THE "A.P." TWO.

(Continued from previous page.)

screened-grid valve (V_1) will no doubt be found perfectly plain sailing. Due note should be paid to the fact that there are two alternative aerial terminals, one of these bringing in a series condenser of the semi-adjustable type in the aerial lead.

This enables you to obtain a higher range of selectivity adjustment than can be got

upon the "A" terminal, a further control of selectivity being given by the use of one or other of the tapping points upon the X coil. The general selectivity of the receiver is very good, and for most situations you will find it is quite enough to use the terminal A and try the flex lead on one or other of the tapping points on the coil.

Adjusting Selectivity.

Where conditions are exceedingly difficult, however, you can obtain a still higher range of selectivity adjustment by transferring the aerial to the terminal A_1 and trying various adjustments of the compression-type condenser C_4 . When this condenser

is in use, by the way, you will generally find it best always to work with the flex lead on that tapping upon the X coil which gives you the louder signal.

The usual grid-bias arrangement is provided for the screened-grid valve, the grid-bias cell itself being shunted by a .01-mfd. condenser to prevent it from having any undesirable effects upon the tuning if the cell should chance to be of high internal resistance as the result of long use.

A modest amount of screening is employed, consisting of just a simple vertical metal screen suitably placed so as to prevent any undesirable amount of interaction between the intervalve coupling circuits and the grid circuit of the screened-grid valve. This, you will find, is quite sufficient to render the receiver completely stable, and it adds very little indeed to the work involved in making the receiver.

Reaction Control.

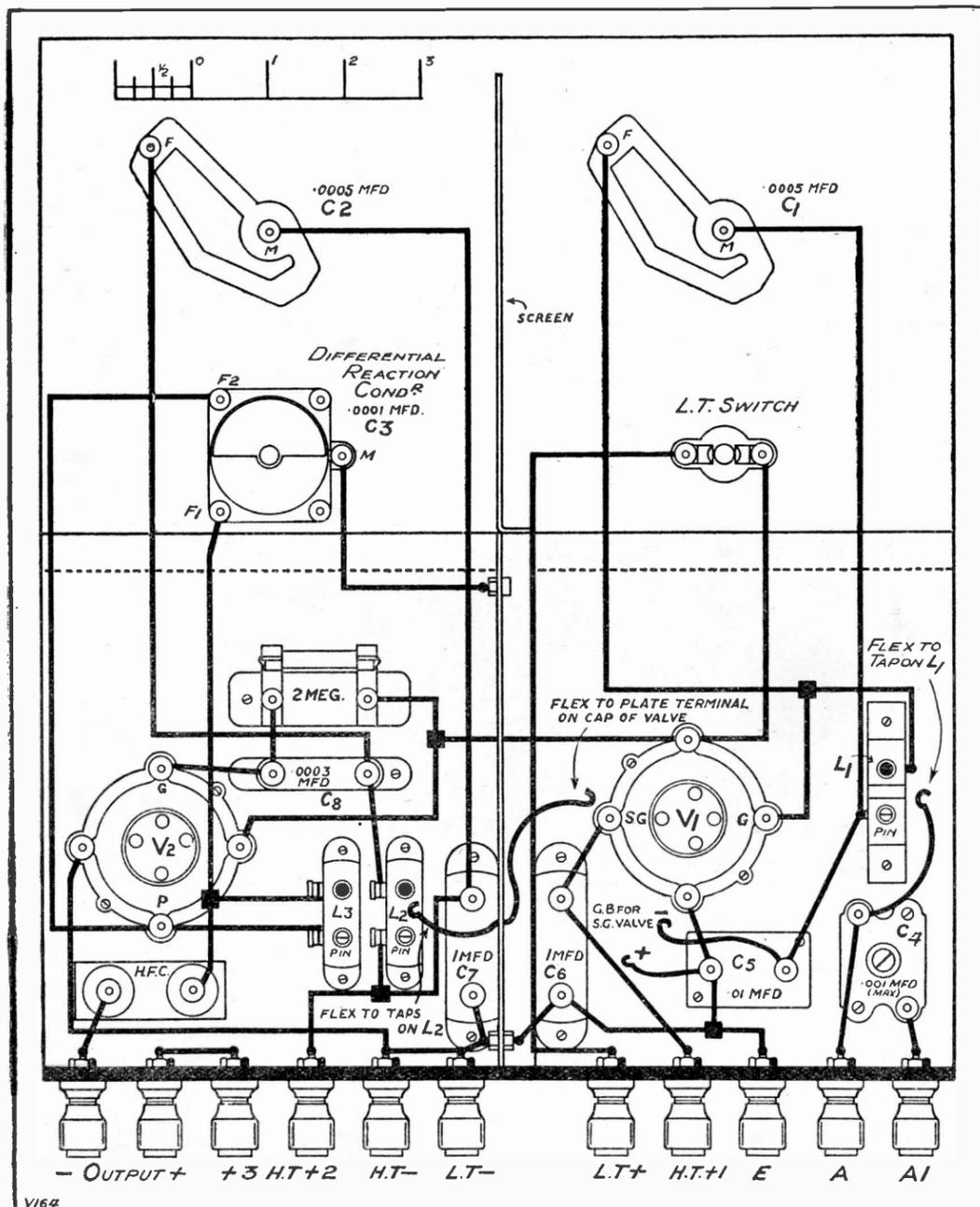
The "X" coil in the anode circuit of the screened-grid valve is so arranged that just a small proportion of the coil intended for coupling purposes is included actually in the anode circuit, so that a weakened-coupling effect is obtained in order to get good selectivity. The whole of the coil is tuned by means of the variable condenser C_5 , and the usual connection is taken off from the high-potential end of this circuit through a grid condenser to the grid of the detector valve.

Reaction is of the special throttle-control differential type developed for use in POPULAR WIRELESS sets, possessing the usual features of particularly smooth control, improved sensitivity, and absence of any effect upon the tuning of the circuit to which reaction is applied.

All the rest of the circuit is perfectly standard and straightforward, and we do not think it calls for any special explanation. Just note, however, that the two H.T. positive leads for the screened-grid valve are by-passed with 1-mfd. condensers in order to reduce the chances of any battery coupling effects with a high resistance H.T. battery.

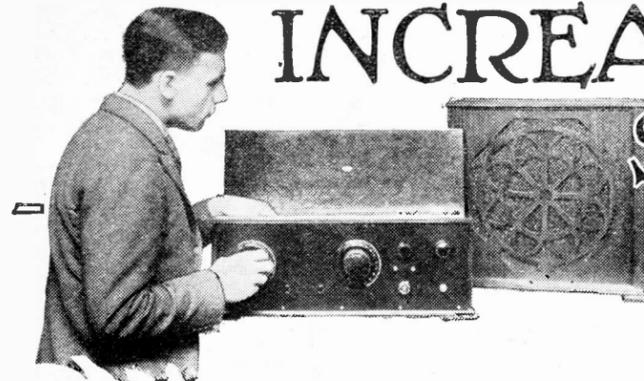
Further details about this extremely interesting receiver will be published in our next issue.

SCALE WIRING DIAGRAM OF THE "A.P." TWO



This is a scale design of the layout and connections of the set. Note that the screened-grid valve holder has its "anode" socket and terminal marked "S.G." This is done to avoid confusion, as the screening-grid pin plugs into this socket, the anode of the valve being taken to the cap on the top of the bulb. The marking of the holder thus—a standard practice in our sets where S.G. valves are used—does not mean the purchase of a special type of holder.

INCREASING YOUR SET'S POWER



How can I get more out of my set? This is the question that is answered in the following instructive article.

By A. JOHNSON-RANDALL.

THOSE of you who have a small set have often thought how much better it would be if you could get many of the stations at much greater strength. If you add a high-frequency valve you will increase the range and bring in more stations and also, of course, bring up the volume of those stations you already receive, but in doing this you will make the set more difficult to control, since you add to it another tuning dial.

In addition, you do not increase the receiver's handling capacity, because that is a function of the last stage, which will naturally remain the same. Therefore, although you make stations louder, you will probably get distortion on your local transmission due to overloading.

Adding an L.F. Stage.

The easiest way out of the difficulty, provided you do not want to bring in more stations, is to add a low-frequency valve which can conveniently be transformer coupled. To do this you can build up a separate amplifier unit, or if there is sufficient room on the baseboard, you can obtain a transformer, together with an extra valve holder, and modify your existing wiring accordingly.

The addition of an extra low-frequency valve is a more straightforward matter than that of an H.F. type. There is less likelihood of trouble, and the results from the loud-speaker point of view are usually more satisfactory. The reason why one so often hears of cases in which howling and so forth have been produced when the extra transformer-coupled stage has been added, is because the additional valve has been connected up in an haphazard manner without the knowledge that with the greater amplification then available there is also a bigger likelihood of something going wrong.

Inserting De-coupling Device.

If the set already includes a transformer stage, the second instrument should have a very low ratio, certainly not greater than 3 to 1. Moreover, it is just as well to incorporate a volume control of some sort such as a potentiometer connected across the secondary winding, because this will give a means of adjusting the power supplied to the last valve.

In order to make certain that motor-boating and other low-frequency troubles do not occur, it is advisable to insert an anti-motor-boating device in series with the detector valve. This can be carried out as follows. Break the lead which at present goes from H.T. positive to one side of the transformer primary in the first stage. Insert a wire-wound resistance of 20,000

ohms or thereabouts, taking one side of the resistance to H.T. positive, and the other side to the transformer primary. On the transformer primary side of the resistance, join a 2-mfd. or 4-mfd. condenser, taking the remaining terminal to L.T. —.

Present Valve Suitable.

You will thus have a means of by-passing, via the condenser, any stray L.F. which may act as a means of coupling through the H.T. supply, to the last valve. Remember that a 4-mfd. condenser is better than a 2-mfd., but you can always try the lower value first and connect another one of the same value in parallel to make 4 mfd.

It is possible that the existing valve, which was previously in the low-frequency socket, is of the power type. If so, this can still be used with advantage, but it is advisable to increase the grid bias on it in order to cut down the plate current passing through the

Now in the case of the last valve, you will need one of the super-power type, because if you want to handle really loud signals and get good distortionless reception, it is no use inserting a small power valve in this socket. A super-power valve will enable you to handle with 120 volts H.T. a grid swing of 16 to 18 volts, which is quite adequate for ordinary domestic purposes. Your volume control across the transformer secondary winding will permit you to obtain the necessary graduation in strength and there will be no excuse for the valve being overloaded.

How to Use a Pentode.

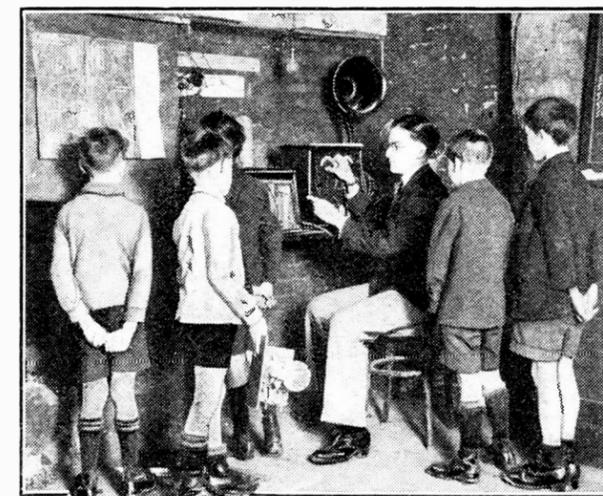
There is a further advantage, and that is that you will be able to cut down the amount of reaction you are using, because of the additional magnification due to the new L.F. stage, and in so doing you will if anything get better reproduction.

There is another method of getting much greater volume, and that is by using one of the new pentode valves. These valves, as most readers are aware, have five electrodes, but from the practical point of view all that one has to remember is that there is an additional terminal on the base of the valve which is connected to H.T. positive.

The only point which seems to prohibit the use of a pentode, somewhat, is the fact that a special output transformer should be used. There is nothing very terrible in this, because all that one has to do is to insert the primary winding of the transformer in series between H.T. positive and the anode of the pentode valve. The loud speaker is then connected across the secondary terminals.

With a pentode one can get much greater power without the necessity of using an extra low-frequency stage, but care must be taken to ensure an adequate H.T. supply. However, if the H.T. supply is sufficient to work a super-power valve, then it is quite good enough for a pentode. With a pentode it is desirable to have a volume control.

THOSE "CRYPTIC" CIRCUITS



A choir boys' radio class in progress after practice hours in connection with one of the well-known English churches.

second transformer's primary winding. By so doing, you will remove any possibility of saturation occurring and, moreover, the comparatively low magnification given by such a valve will reduce the possibility of L.F. troubles. It is never advisable to get too much magnification per stage, and although you may grudge this slight loss of volume, you should bear in mind that this is better than to have a very big volume with distortion. After all, the loss of volume will be quite small.

CAPT. ECKERSLEY'S QUERY CORNER



PROS. AND CONS. OF CHOKE COUPLING—
THE DETECTOR'S BY-PASS—A SELEC-
TIVITY QUERY—THOSE "JAMMING"
SHIPS.

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

Pros. and Cons. of Choke Coupling.

P. C. (Cardiff).—"I notice that choke-capacity L.F. amplification is very rarely used these days. I was listening to a set quite recently which had two stages of this form of coupling, and the quality was all that could be desired. Has choke coupling any disadvantages?"

It is true to say that choke coupling has advantages and disadvantages. The advantages of choke coupling are that one does not drop voltage on the anodes because the choke has small D.C. but large A.C. resistance (or impedance really). But the impedance of a choke varies with frequency, and may therefore give different effects at different frequencies, giving less magnification at low than at high frequencies.

If the chokes are made very high they have capacity effect, and spurious resonances may come in; furthermore, resonances are set up as between the inter-coupling condensers and the chokes.

However, it isn't all so bad as it sounds if it's worked out practically. Theoretically there are snags which the R.C. coupling gets over in practice.

Choke coupling is perfectly good if one isn't aiming at absolute theoretical perfection, and it is handled by someone who understands the quantitative implications.

The Detector's By-Pass.

R. W. T. (Hounslow).—"Having been advised to fit a fixed condenser of a value not exceeding .0003 mfd. across the plate and negative filament lead of my detector valve (which does not include reaction), I find that a marked increase in volume results. This, of course, appears to be an improvement, but it has since struck me that a definite loss of the higher frequencies also occurs. Is this so, and do you consider the increase in sensitivity outweighs the disadvantages mentioned? A differential reaction condenser would appear to give a similar effect when set at 'minimum.'"

Certainly the effect of the condenser might be to diminish the higher frequencies, but not very much in common types of circuit, but I think this is more likely to

occur owing to spurious reaction effects than simply *per se*.

The increased volume would not occur if the condenser were only by-passing high-frequency, unless that high-frequency was saturating your low-frequency system. Thus I suggest your increase of volume is due not to by-passing H.F., but rather to increased spurious reaction effects owing to changing the phase of the detector anode currents. Whatever it is it's purely for you to decide which arrangement you like best.

A Selectivity Query.

J. S. B. (Enfield Town).—"I have in use a simple form of rejector to eliminate one or

tivity in series with a non-selective device the result is determined as a balance between the two factors. If you have a device which helps the selectivity in series with a fairly selective device the result is better than without that device.

The tapped coil is moderately but possibly not wholly sufficiently selective for the purposes you require. The addition of the rejector adds just that extra selectivity required.

The plain coil arrangement is very unselective, and the addition of the rejector is not enough to make the whole arrangement sufficiently selective. Merely once more a question of magnitudes.

But I suggest if it's *only* the two Brookmans Park transmitters you want, a smaller aerial and a tapped coil will not want the addition of a rejector. Again a question of magnitudes.

Those "Jamming" Ships.

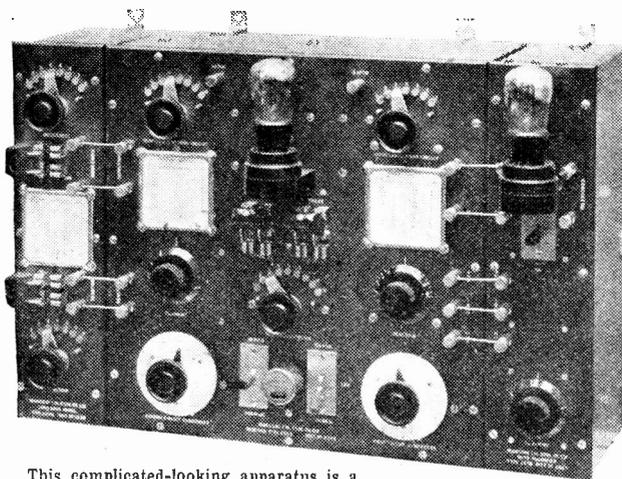
G. R. C. (Dover).—"I am getting serious interference on my three-valve (det. and 2 L.F.) set from Morse stations, which I assume to be ships working in the Channel. This interference frequently interrupts the broadcast programmes, and I shall be pleased to know if there is any method of cutting it out?"

I have no personal experience to guide me in answering this question. I think the jamming experienced at Dover is probably impossible to eliminate altogether, because spark transmissions overlap from the fundamental wave they are supposed to use into the waves assumedly reserved by international agreement for other services.

It's all a question of relative magnitude. I do not know the degree of magnitudes involved, but I very much doubt if you can do anything technical to your set to be rid of the nuisance.

But you can write to the B.B.C. and the Post Office and ask them why if you pay your licence you should be troubled in this way. I have been trying for years to get people to take a proper view of these problems, and to ask that ships shall be compelled to use apparatus which technically meets the needs of other users of the ether. Every little helps!

A SHIP'S RECEIVER



This complicated-looking apparatus is a Marconi marine receiver, which has a wavelength range of from 220 to 27,000 metres.

other of the Brookmans Park transmitters. With a plain aerial coil this device merely alters the tuning position of either station, but does not enable me to eliminate them.

"Using a tapped aerial coil under similar conditions permits reception of one station free from the other by using the rejector. Why should this happen?"

If you put a link capable of standing ten tons in series with your watch chain and subjected the whole device to a pull of five tons the whole device—watch chain plus strong link—would break. The weakest link determines the strength of the chain.

If you have a device which helps selec-

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



NEW PICTORIAL MAGAZINE.

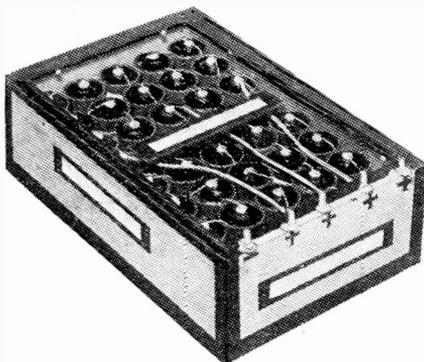
NUMBER 1 of Vol. 1 of "Radio" has made its appearance. "Radio" is a monthly pictorial magazine due to the Marconiphone people and its purpose is "to popularise radio in general and Marconiphone radio in particular."

The publication consists almost entirely of pictures and there is even a strip cartoon. It is excellently produced and should accomplish its objects quite easily. "Radio" is being distributed only through Marconiphone dealers and the price is 1d.

MAKE YOUR OWN BATTERIES.

Two great advantages attend the home assembly of H.T. batteries. One is that it saves money and the other that you get a clearer insight as to the quality of its innards. For some years the Leyton Battery Co., Ltd., of Church Road, Leyton, E.10, have specialised in the production of battery parts for home assembly and, from time to time, we have chronicled their progress in this interesting sphere.

Their latest scheme provides a reliable, robust and handsome H.T. battery that is



Here is the Leyton Battery Co.'s new product.

well within the capabilities of the average radio constructor to assemble. It is built into a glass-lidded box with the tapping sockets taken out at the one end, and it really does look an attractive proposition.

We have tested the cells that are made for this particular battery assembly, and find them of first-class quality. We would advise "P.W." readers to secure the leaflet regarding this interesting design.

MAGNUM RESISTANCES.

Quite a novelty in the way of radio components is due to Burne-Jones & Co.,

Ltd. This is the Magnum Spaghetti Resistance which in appearance is nothing more than an insulated flexible lead, having a ring terminal at each end.

It measures about 4 in. in length and can, of course, be wired in circuit just like a short connecting lead. Rather a curious idea, that, but one that definitely does make for the saving of space and ease of construction.

The Magnum Spaghetti resistance is available in any one of some dozen values from 1,000 to 50,000 ohms. Up to 40,000 ohms the carrying capacity is 10 milliamperes, and that of the 50,000 ohm type, 5 millamps. The price is 1s. 6d.

USEFUL LISSEN DEVICE.

If your set should necessitate one or more of those little compression type condensers, or should you be building a wavetrap or "P.W." Brookmans Rejector, don't forget the claims of the Lissen Pre-set Condenser.

It is not an absolutely new component, and I have the uncomfortable feeling that I received one for test quite a long time ago. However, I hasten to repair the omission of its review in these pages.

The little variable is of distinctive design, as you can see by the photo, and it is so arranged that it can be mounted either vertically or horizontally.

The moulding of the case is first-class and the adjustment smooth and easily set.

Altogether one has no hesitation in saying it is well up to the highest standard that can be set for such a device.

AN "ATLAS" BATTERY ELIMINATOR.

H. Clarke & Co. M/C., Ltd., of Manchester, are producing some fine mains units these days. Indeed, they are well in the front rank in this respect. We have had two or three pass through our technical department during the past few weeks, and I was particularly attracted by the A.C.16.

This is an A.C. mains unit of unusually attractive design having one variable tapping, and two fixed, giving up to 150 volts. Full-wave rectification is employed and

the maximum output in milliamperes is 25.

This particular model, the A.C.16, was tested in conjunction with several different sets, and in every case it gave complete satisfaction. The smoothing is good, rather better than in the average commercial mains unit, and I found the outputs identical with the specification.

The variable tapping gives a smoothly-controllable range with none of that jerkiness or noisiness that is so disconcertingly

When you are Buying—

26.—SCREENS.

Screening partitions and screening boxes are used in many modern receiver designs.

Aluminium is mostly used for those screens figuring in H.F. circuits, but for the screening of mains transformers, H.T. units etc., a stout gauge of iron sheeting is desirable.

In the case of aluminium screens for H.F. stages, see that any holes cut for valves are of correct sizes. The valves should fit closely.

Some A.C. valves demand larger holes. Also watch the insulation of leads passing through and ensure that connecting screws are provided, as aluminium is a difficult material to solder.

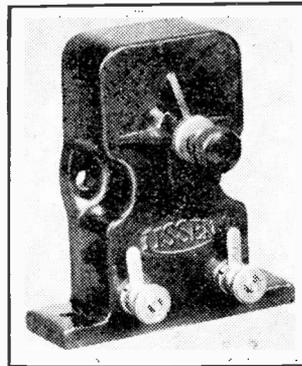
Adhere very closely to the recommended specification, as if the screen is of different dimensions it might fail in its purpose.

If a complete box with lid is advised don't attempt to improvise with less effective screening.

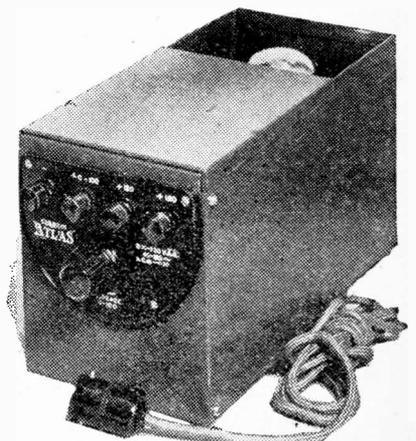
prominent in some units. Also, there is an unusually good separation between the tappings and, altogether, it is obvious that the design and construction are quite sound throughout.

AN "EKCO" MAINS UNIT.

I made a slight slip last week in reference to that "Ekco" A.C. Mains Unit that provides you with both an H.T. and an L.T. charging current. I referred to it as the "Ekco" (CT1 A.C.), whereas it really is the CPI A.C.. I hope I have not caused any confusion anywhere by this little error.



The Lissen Compression Type Variable Condenser.



The "Atlas" A.C. Mains Unit.

EVERYTHING *The* **G. & C.** ELECTRICAL
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TYPES		OLD PRICES	NEW PRICES	TYPES		OLD PRICES	NEW PRICES
Osram	H.L. 210	10/6	8/6	Osram	P. 2	15/-	13/6
"	H. 210			"	P. 240		
"	L. 210			"	P. 425		
"	H.L. 410			"	P. 625		
"	H. 410			"	P. 625A		
"	L. 410			Osram	S. 215	22/6	20/-
"	H.L. 610			"	S. 410		
"	H. 610			"	S. 610		
"	L. 610	Osram	P.T. 240	25/-	22/6		
Osram	P. 215	"	P.T. 425				
"	P. 410	"	P.X. 4				
"	P. 610	12/6	10/6	"	P.T. 625	30/-	27/6

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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and 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.

ADJUSTING THE POTENTIOMETER.

L.B.F. (Birmingham).—"So for the time being I am going to hook up my single-valver and reach out with that. The idea was to put a potentiometer in the grid return circuit, the ends being wired across the filament and the slider going to the non-grid end of the grid leak."

"It certainly seems to make a difference, though I am not sure how it should be adjusted

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for maximum strength and distance getting. What is the best way?"

At first you should put the potentiometer slider about half-way round and ignore it until the other circuit conditions are satisfactorily adjusted. Get your coil-coupling right, adjust your H.T., etc., and when the set seems absolutely O.K. see to the final touches to the potentiometer as follows:

Usually the detector valve requires comparatively low H.T. voltage, perhaps 35 or 40 or 50, and its filament should be turned nearly but not quite full on. Now set the tuning condenser somewhere near the middle of its scale and move the potentiometer slider round to the positive end of its travel.

If you now test the reaction condenser you will probably find it rather plumpy, so gently move this slider round slowly towards the negative end, adjusting the reaction control as you do this,

You will find that it gets smoother and smoother as the slider is advanced further towards the negative, but the disadvantage of proceeding in this way is that the signal will probably be weakened slightly the further negative you go.

The detector anode voltage and its filament current should be readjusted with the object of finding a setting which will enable you to turn the potentiometer slider round as far as possible towards the positive end without spoiling the smooth reaction which is so essential for successful working. The farther you are able to get the slider towards the positive the more sensitive the set will be.

Remember that you should not be tempted to carry it round too far, however, and thus make reaction go in and out with something like a "plon," for it is quite hopeless to attempt to tune in long-distance stations unless the set comes up towards and goes smoothly through the oscillation point.

Remember also that the degree of coupling on the aerial will also affect reaction, and on no account forget that both filament voltage and H.T. voltage on the detector are of vital importance for getting maximum results.

FITTING A FUSE.

J. H. V. Z. (Cape Town).—"Your 'Magic Four De Luxe' circuit is all that is claimed for it, and gives splendid results at the Cape of Good Hope. In trying to safeguard my Mullard 4-volt valves I put a safety fuse in the connection between the negative H.T. and negative L.T., but I find that the tiny globe glows with the L.T. current switched on but the set will not work. Can you tell me what is wrong, and what position should the fuse be in circuit, in order to give the desired results?"

It is evident from your description that the fuse is at present in the L.T. circuit, and this, of course, is "all wrong."

Apparently you have broken the wire from the L.T. terminal on its way to the valves. This wire should be restored as before, and the fuse holder inserted instead in that section of the lead which goes from the L.T. wiring to the H.T. battery (H.T. negative) only. If you employ a common terminal for L.T. and H.T.—you must break the flexible lead which comes from the negative of the H.T. battery, the idea being that this fuse holder should be inserted in the lead which comes direct from the negative of the H.T. battery before it joins any other part of the set.

When the bulb is placed in the holder after the alteration has been carried out you will find that switching on the L.T. current does not cause the bulb to glow. In fact, it should not glow under any circumstances unless something is wrong in the wiring, or in the conditions under which the fuse is being operated (such as a faulty by-pass condenser causing a short or connections touching wrongly somewhere or some similar fault in the circuit).

The operation of the set will, in fact, be exactly the same as before, and the fuse will act just as a piece of connecting wire, the only difference being that in the event of excessive current being carried through some fault in the circuit, the fuse will glow brilliantly for a moment and then burn out, thus giving notice of the fault and breaking the circuit for you until the trouble is put right.

In this way, insertion of the fuse ensures safeguarding of the battery.

CONDENSER CAPACITIES.

F. C. I. (Dollis Hill, N.W.10).—"How can one tell the strength of different variable condensers, i.e., variable .0003, .0005, .00035, when the condensers are not marked? Also, what are the grades in common use?"

"Also block condensers, some makers mark the capacity on them, some do not and some only mark the boxes. But when they are loose with no boxes, how can one tell?"

We presume that by the "strength" of condensers you mean the capacity. This can be calculated (in the case of variable condensers) from the active area of the surface, and the spacing between fixed and moving plates.

This calculation is rather a troublesome one and hardly worth giving, for no one attempts to work it out these days. Any dealer can usually tell you at a glance what the capacity of a variable condenser is or failing this someone experienced will do so without the necessity for calculation.

The capacities in common use are as follows: For tuning, practically all variable condensers are .0005. This value in conjunction with ordinary coils happens to be a convenient one, spacing the stations nicely apart when tuning, and allowing the wave-length band to be covered with the average coil.

For short-wave work, and certain special circuits, smaller condensers are advisable, and in this connection there are .00035, .0003, and .00025 on the market, and also a limited number of smaller condensers, such as .0002, .0001, etc., though these are not commonly used. Sometimes you can settle the question of the capacities of your condensers by how many plates they have, or alternatively the capacity can be tested out on tuning.

To do this, join one side of the condenser to one side of your tuning condenser in the set, and join a flexible lead to the other side of the condenser under test, using for this a crocodile clip, or similar method of easily cutting it in or out of circuit as required.

Now tune your set condenser when one side of your test condenser is disconnected, so that it is out of circuit, and notice the dial readings for various stations. If your tuning condenser is a .0005 mfd. you may find that at, say, 25 degrees the National comes in, at 50 degrees the Regional and 75 degrees the Daventry 5 G B. Now join the other condenser across it, turn the tuning condenser all out so that it is not effecting any tuning at all, and then tune in on the condenser under test.

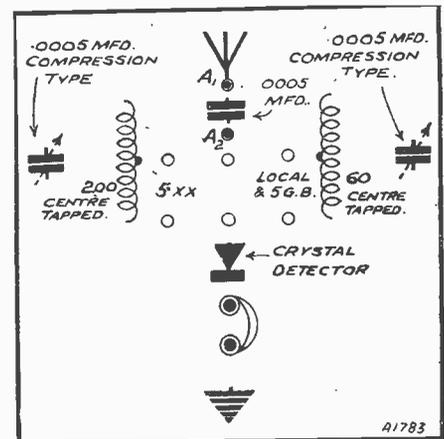
If it is the same size as the tuning condenser, the readings will be approximately the same, namely 25, 50, and 75. If, however, it brings in the National at 50 degrees and the London Regional at 100 degrees it is obviously only about half the capacity of the original condenser, namely .00025 mfd.

By comparison in this way you can easily arrive at the capacity, remembering that those values quoted above are the only ones likely to be in common use.

The same applies to fixed condensers, though in this case, it may be necessary to vary the tuning condenser slightly to bring in a test station. This is in order to ascertain whereabouts the fixed condenser is "tuning," as it is unlikely that a fixed capacity will exactly bring up the set to the required value to show you whereabouts you are on the tuning scale.

(Continued on page 600.)

POPULAR "WIRELETS" No. 16



Here are the "parts" for a crystal set with easy change-over from 5XX to the local station, and vice versa. Either a D.P.D.T. switch or flex can be used for switching, and once the condensers have been set they can be left and either programme received at will without re-tuning.

Can you "WIRE UP" this set?
(Look out for the answering diagram next week.)

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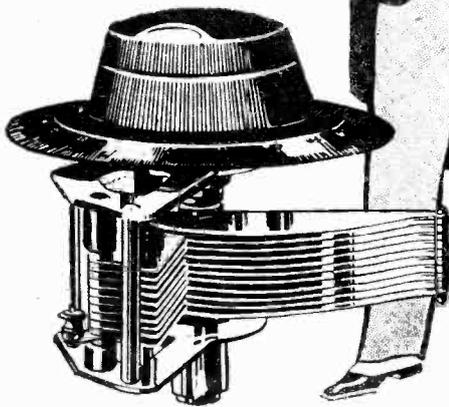
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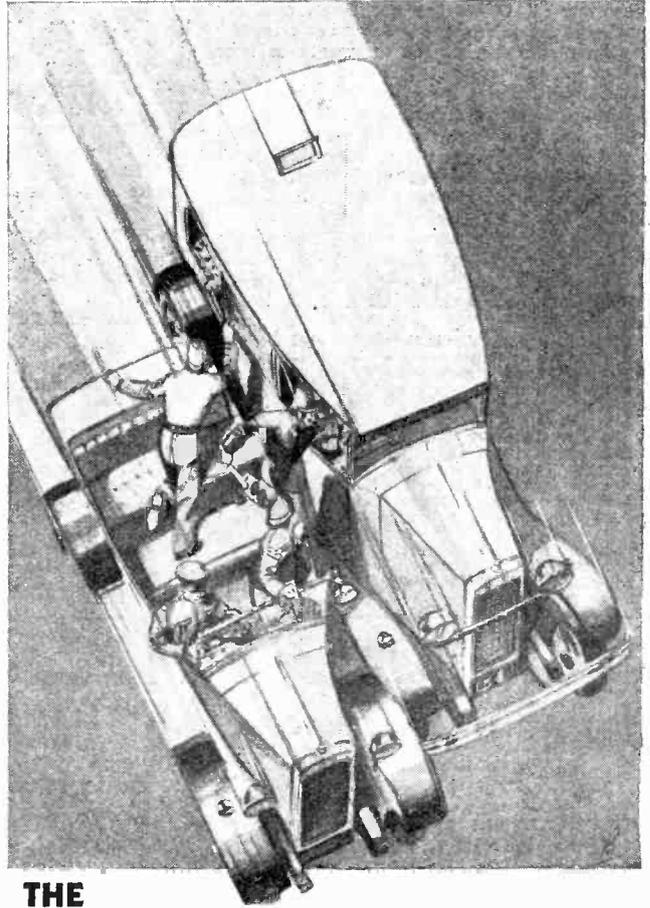
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RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 598.)

USING THE WAVE-TRAP COIL.

F. S. (Ponders End, Middlesex).—"I am enclosing a sketch of my circuit, which shows that the set is good for long-distance but has been modified in order to put the lid on Brookmans.

"As a matter of fact, I hardly listen to the local station at all, but am only too glad of a good wave-trap which cuts it out completely. However, all tastes are not alike, and my mother is rather anxious to listen-in during the daytime, and she, of course, wants to hear L.O.

"As she likes to listen on 'phones, I was thinking of making an alteration to the set to enable her to do this, but I do not want to spend more money than is necessary. So could I use a wave-trap coil for the purpose by means of a switch or something to control it to save fiddling about with tuning?

"If this cannot be done easily, I may decide not to bother at all, as although she would like it, I do not want to go to any expense about it, nor to alter the set much just in order to get the local station?"

It is the simplest thing in the world to get the local station, and all you need for the purpose is a crystal detector and a pair of telephone terminals. You need not alter the tuning of the set, nor affect it in any way, but simply make the following small modification.

Join one end of the crystal detector to one end of the wave-trap coil, the other side of the crystal detector should be taken to one of the new telephone terminals. The other new telephone terminal should be joined to the remaining side of the wave-trap coil.

This is all the alteration that is necessary to make the set ready for local reception. You will find that when no 'phones are connected up to the two new telephone terminals the circuit is unaltered and remains exactly as it was before.

All tuning, etc., will be unaffected, so that the set can be tuned, switched on and off, and left as it was

without any attention being paid to local listening. When your mother wants to hear what the local station is doing, all she has to do is to put a pair of telephones into the two new terminals.

Then, whether the set is switched on or not she will hear the local programme. When she has finished she merely takes out the 'phone tags and the set is then again as before for long-distance reception.

WHAT DO YOU THINK ABOUT THIS?

It is a fault that doesn't very often occur and yet not long ago several "P.W." readers reported identical cases of it on the same day. These were the symptoms:

An H.F. unit employing an S.G. valve was built up from a theoretical diagram. The wiring, etc., was carefully done, but when the unit was connected up it cut off the signals instead of amplifying the weak ones.

Evidently something was radically wrong, but tests of batteries, etc., seemed to indicate that it wasn't an ordinary fault like a break in the circuit.

Can you guess

WHAT WAS WRONG?

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

The trouble which was described last week—poor strength, hand capacity, etc.—was found to be due to a defective earth lead. It had broken through just below the surface of the ground, and when a new wire was fitted the set was restored to full results again.

WIRING IN WORDS.

C. L. (Coventry).—"The wiring in words says, 'Join L.T. neg. to H.T. neg., to earth terminal, to one side of the coil holder, to one side of the V. condenser and to one filament terminal on the valve holder.' Does that mean all separate wires?"

No. When two points are joined together by a connecting wire they become, in effect, one. So in carrying out the above, if you first join L.T. neg. to H.T. neg., and the "earth" terminal, connection can be made to L.T. neg., or to H.T. neg., or to the wire joining these.

The next step is to carry on to the coil holder, so this join would be as short and direct as possible, and would go from the coil holder to the nearest available point. That might be L.T. neg. itself, H.T. neg. itself, earth terminal itself, or any point on the wire joining these together. And so on.

'PHONES IN PARALLEL.

E. N. (Hamilton, N.B.).—"Recently you told R.A., Sheffield, how to join 'phones in series.' But you did not explain 'in parallel.' How are 'phones connected in parallel? (Please give the same kind of easy-to-understand description, as I know next to nothing about wireless.)"

Suppose you have the set in front of you, with its telephone terminals ready for the 'phones. And you have two pairs of 'phones, which we will call "pair A" and "pair B" respectively.

To join them in parallel, connect one 'phone tag of "pair A" to one of the set's telephone terminals, and join the other "pair A" tag to the other telephone terminal. (That is to say, join up the "pair A" 'phones as usual.)

Now take the "pair B" 'phones and insert them in exactly the same way, viz., one tag to one terminal, and the other tag to the other. The two pairs of 'phones are then joined "in parallel."

N.B.—If it is a valve set to which the 'phones are to be connected, make sure that they are joined up the right way round. Each 'phone lead has one "plus" and one "minus" lead, and the set's telephone terminals are (or should be) marked + and - also.

The "positive" tags should go to the terminal marked +, and the "negative" tags to the terminal marked -.

Sometimes the positive tag is not marked +, but is coloured red, whilst the negative is coloured black (or blue) to distinguish it.

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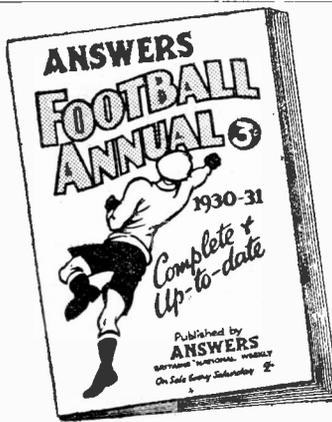
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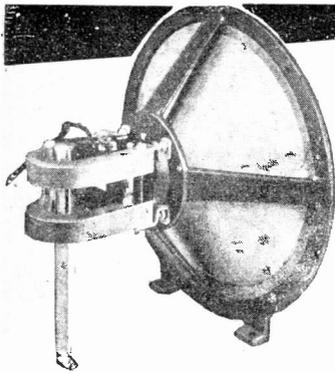
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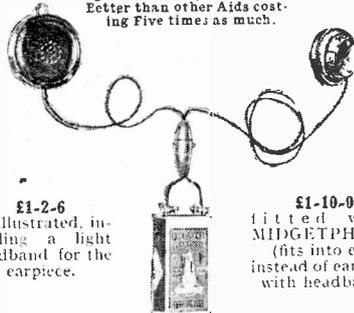
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FOR THE LISTENER.

(Continued from page 585.)

Explain, Please.

I wish you would explain it to me. I have been explaining things to you for months now, and you haven't yet explained a single thing to me!

You didn't even explain how I might spot the winner in the Derby! But surely some of you can explain this. Make it your "one good deed," like a Boy Scout, for your August holiday. And your petitioner will ever pray . . .

Selection.

For I imagine that it would be easier to select among the long-wave stations than among these millions of short-wave ones. And here is another I want explaining.

The other night I wished to hear "Antony and Cleopatra" from London. Frankfurt (390) was in the offing, and Toulouse (385) was as usual taking as much as it could of the air; but I got London and held it quite nicely. All went well for about a quarter of an hour, when, suddenly, out of the blue, a military brass band from somewhere blotted London and everything else off the map!

It came in with an absolute blast, and in a couple of minutes went out again, leaving London and "Antony and Cleopatra" as before. I hadn't touched the dial.

The same thing happened once again in the course of an hour. I gathered from the programmes that it didn't come either from Frankfurt or Toulouse. Then where did that blasting brass band come from? And why did it come and go like that? Like a naughty boy peeping round a corner, pulling bacon at you, and popping back again.

"Antony and Cleopatra."

I was surprised, though I ought not to have been, that this play made such a good broadcast. Indeed, as I listened to it, it almost seemed as if Shakespeare might have written it for the wireless.

Those swift, short scenes, with a kind of cinematograph effect, made admirable radio stuff. The two players taking the parts of Antony and Cleopatra were very good in diction and in dramatic effect.

If other Shakespearean plays can be made as effective as this was, it is likely that the great William will become more popular on the air than in the West End. Mr. James Agate will be consoled.

Ethereal Pockets.

Are there such things. More explanation wanted. Sometimes, when I am listening to the "British Isles," and for no apparent reason, the broadcast ceases suddenly for a minute or so, then picks itself up again. As if the wave had suddenly dropped like an aeroplane in an air-pocket. Why is this?

Rome and Milan.

Naturally, I have no difficulty with the Italian stations, except that of cutting them out on occasions. I have a bad ear for language, and though I know a lot of Italian words I do not always recognise them when spoken.

So I stick mostly to music. It is very good. I have heard three operas this week—"Eva" (Lehar), "Lucia di Lammermoor" (Donizetti), and "Rosmunda" (Trentinaglia).

TECHNICAL NOTES.

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

Testing Speakers and Pick-ups.

We were talking the other day about the reproduction of bass notes by different types of loud-speaker unit, and I am obliged to a reader for a useful hint which I might have thought of at the time. It is simply this: that the low-frequency response of a loud-speaker unit can be very simply tested by means of the "frequency records" which are now obtainable for use on an ordinary gramophone.

By using these standard-frequency records with a good electrical pick-up, it is a very simple matter to test your loud speaker for different frequencies.

Frequency Records.

If the bass notes, say, down to 200 or 150 cycles come out well, you may be sure that both the loud speaker and the pick-up are operating effectively in the lower register; but, incidentally, if these lower frequencies do *not* come out well, it is not necessarily the fault of the loud speaker, but may be wholly or partly due to the electrical pick-up. In such a case, before blaming the loud speaker, it is a good plan to try a different pick-up in the same conditions.

NEXT WEEK

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Alternatively, before blaming the pick-up, you might try the same pick-up with a different loud speaker. By a few simple experiments of this kind you can rapidly obtain quite a lot of valuable information with regard to the characteristics of your different pick-ups and loud-speaker components.

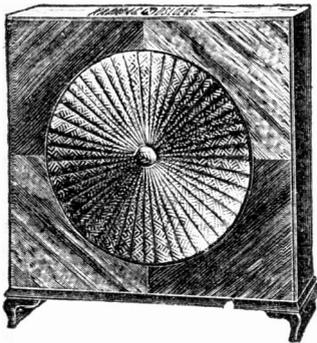
Wave-Traps.

The use of wave-traps has, of course, very greatly increased since the opening of Brookmans Park transmitters, but although wave-traps are comparatively simple devices, both in construction and use, I often hear from readers who do not seem to be finding them very successful.

There are certainly some cases in which even the best of wave-traps will not altogether "do the trick," but these cases are rather exceptional, and usually, if a wave-trap does not fulfil its purpose, the fault lies either with the construction or design of the wave-trap or with the way in which it is operated.

Design and Construction.

So many designs of wave-traps have now been published for the benefit of amateur
(Continued on next page.)



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TECHNICAL NOTES.

(Continued from previous page.)

constructors, especially since Brookmans Park came on the air, that I do not think I need go into the general question of the actual making of the trap.

It may be better to say a few words about the way in which it is used. When you are at a fair distance from the station which is to be cut out, you will generally find that the particular tapping which you use (in a tapped wave-trap, of course), will not make a very great difference to the result, but if the undesired station is comparatively near, the question of the exact tapping becomes much more important.

I therefore strongly recommend that if your wave-trap does not seem to be satisfactory, you should experiment with the different tappings until you find the one which gives the best results.

This should not take very long, and a short time spent in experimenting in this way may mean a great difference to the satisfaction which you obtain from the addition of the wave-trap to your receiver.

As you know, wave-traps are classified broadly into the "acceptor" and "rejector" types, and although there are advantages and disadvantages in both cases, there is no doubt that in some cases the one type will give better results than the other.

Adjusting the Trap.

The tuning in a wave-trap, that is the resonance, is often very sharp, and the efficiency of the trap may depend enormously upon very precise adjustments in the region of the resonance point. Therefore, as I have already said, it pays to get this adjustment as accurate as possible.

I often hear people say that they have tried a wave-trap with their set, but they "do not seem to find that it makes much difference."

With comparatively rare exceptions, wave-traps should certainly make *some* difference, and in many cases a very great deal of difference, and in the majority of cases where the trap does not seem to be worth while, the trouble lies in its adjustment and operation.

Anyway, the "P.W." Brookmans Rejector is a simple device to operate and definitely does work very efficiently.

Electric Change-Over.

An interesting question has lately arisen in connection with the use of radio appliances connected to the electric mains. In certain parts of the country, the electricity-supply undertakings have changed the voltage and nature of supply, and this, of course, has upset the arrangements of a considerable portion of the radio listeners in the district.

The question now at issue is whether those whose receivers or other radio apparatus have been rendered virtually useless have any claim for compensation from the electric-supply people.

I understand that this question is either to be settled between the representatives of the radio industry and the electric-supply undertakings in questions, or may, in fact, possibly be put to a test case in the courts.

An Important Question.

In certain districts where a change in the nature of the electric supply has been made, (Continued on next page.)

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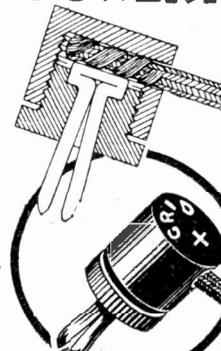
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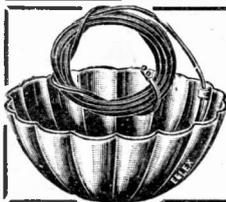
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TECHNICAL NOTES

(Continued from previous page.)

the local municipality has undertaken to readjust matters for listeners free of cost, that is, either to supply them with additional components, or in some other way to put them in the same position as they were before the change-over was made.

This is, of course, a very important matter where any change is made in the electric supply, as the radio listener may have gone to a good deal of expense in providing himself with elaborate apparatus working from the electric mains.

Summer Reception.

I have had a number of letters from readers in the Provinces pointing out that lately they have not been getting as good reception as usual from the London National and Regional Stations. In some cases they are puzzled also by the fact that long-distance reception nevertheless comes in more or less as usual, and want to know why this should be.

It is more or less to be expected during the summer months that reception of the London National and Regional Stations should be subject to fading, particularly for listeners situated in the Provinces a fair distance away from London.

Erratic Reception.

Another type of query which I receive from time to time relates to erratic results with the earth connection. I mentioned another aspect of this matter some little time back.

Experimenters often find that they get better results when the earth lead is disconnected than when it is connected, and as this is apparently so contrary to the instructions in the book, it is naturally rather puzzling.

Of course, it goes without saying that if you get better results with the earth lead disconnected than with it connected (in a circuit which is intended to work with an earth connection), there must be something wrong with the circuit.

Trouble often arises owing to the earth connection not being a satisfactory one (connected to a cold-water pipe or a good earth plate), but even this will not account for the results being better when the earth is disconnected. It would simply mean that the signals obtained were not as good as they should be.

No Reaction.

I have generally found when the disconnecting of the earth leads gives better results that this is due to the fact that with the earth lead connected it is impossible to take proper advantage of reaction. The trouble may be cured sometimes by increasing the number of turns on the reaction coil, or alternatively, by introducing a fixed condenser in series with the aerial lead. The value of this condenser may be between .0001 and .0002 mfd.

If your earth connection is a satisfactory one, I think you will generally find that one or other of these dodges will make all the difference. When the right conditions are obtained there should be a pronounced improvement in the signals obtained when the earth lead is connected.

Moving the Set.

Whilst on this question, I may perhaps mention another query which I have received once or twice, relating to the difference in the operation of the set in different places; a set will, for instance, work quite satisfactorily in one house, whilst, when removed to another house, and connected to another aerial and earth, it will work only poorly.

Here it is clear that the difference must be due to the different aerial and earth system. Leaving out the question of aerial capacity which, if it makes any serious difference, can in any case be allowed for, it is most probable that the trouble is due to an inefficient aerial or earth, possibly both. I need not say anything more about the earth connection, and as regards the aerial it is possible that this may be of poor design, but still more likely that the trouble lies with the insulation.

Tracing Faults.

I am often asked for simple directions for testing over a set to find out whether it is all O.K. It is fairly easy to give a few general directions; these are already known to the experienced radio experimenter, although not perhaps to the newcomer.

But a great deal naturally depends upon the type of receiver, and special or complicated circuits require special directions relating to their particular features.

The following, however, are a few simple rules which may often help you to discover the more usual causes of trouble.

Examine the Valves.

When the valves are all inserted in their sockets, naturally the first thing to do is to switch-on and make sure that all the valves light up. Then try tuning the set, and if you do not seem to receive any signals, it may be that something is wrong with the other connections (other than the filament connections) of one of the valves.

This can be discovered by gently tapping each valve in turn with the finger-nail, when a ringing microphonic noise should be heard from the loud speaker.

The H.F. Stages.

In the case of a set having one or more high-frequency stages, it is possible that there may be some fault in one of these stages. To eliminate the H.F. stages you may connect the aerial lead-in to the grid of the detector valve instead of to the aerial terminal of the set; it should be connected, however, through a small fixed condenser.

If on doing this you find that you get signals, however weak, whereas you did not get them when the aerial lead-in was connected to the aerial terminal, it suggests that the detector valve and subsequent valves are working O.K., but something is wrong with one of the H.F. stages.

Try the Output.

On the other hand there may be something wrong with the final or output valve, and to test this you may disconnect the loud speaker from the plate circuit of the output valve and then connect it across the primary of the transformer of one of the low-frequency amplifying valves (or the anode resistance in the case of R.C. coupling). If this brings in the signals when they were absent before, it seems to show that the last valve is the cause of the trouble.

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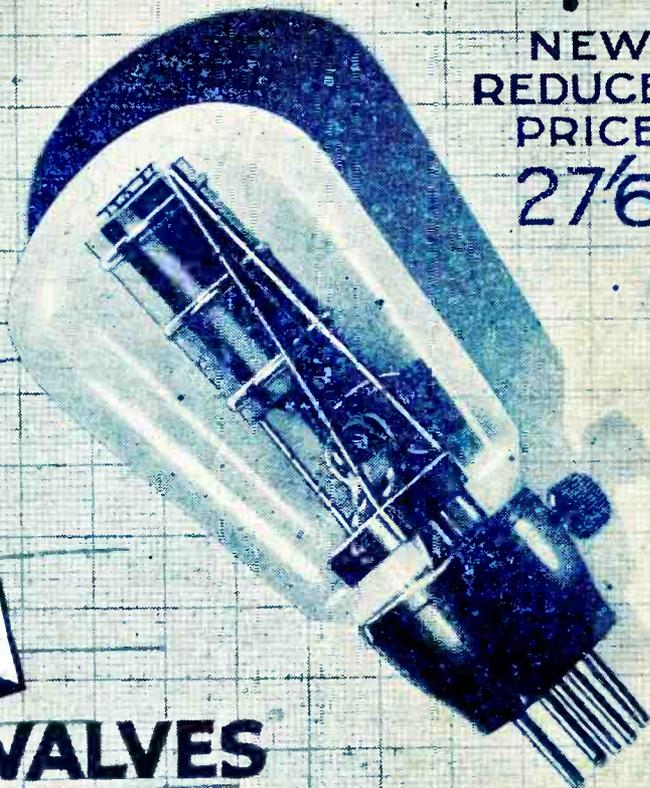
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