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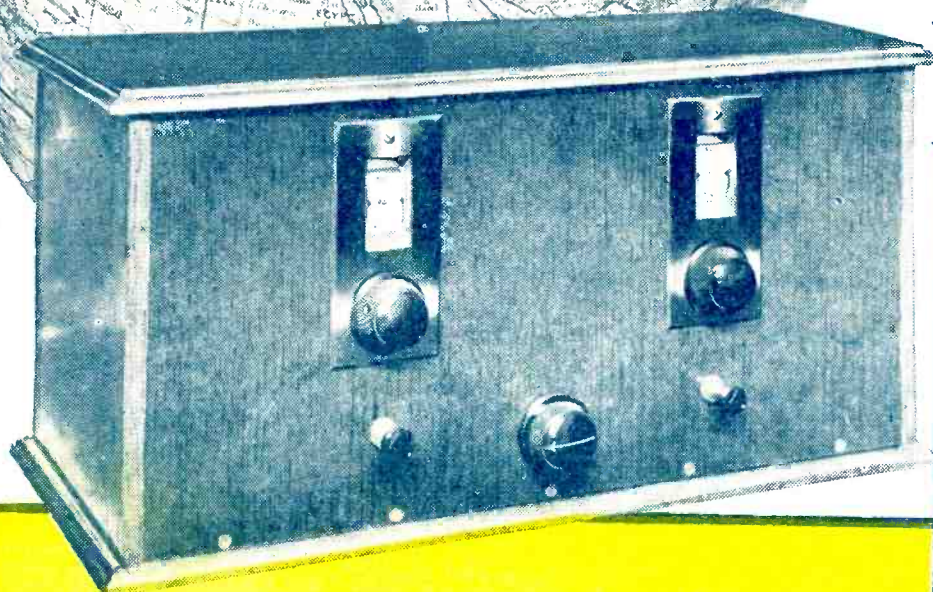
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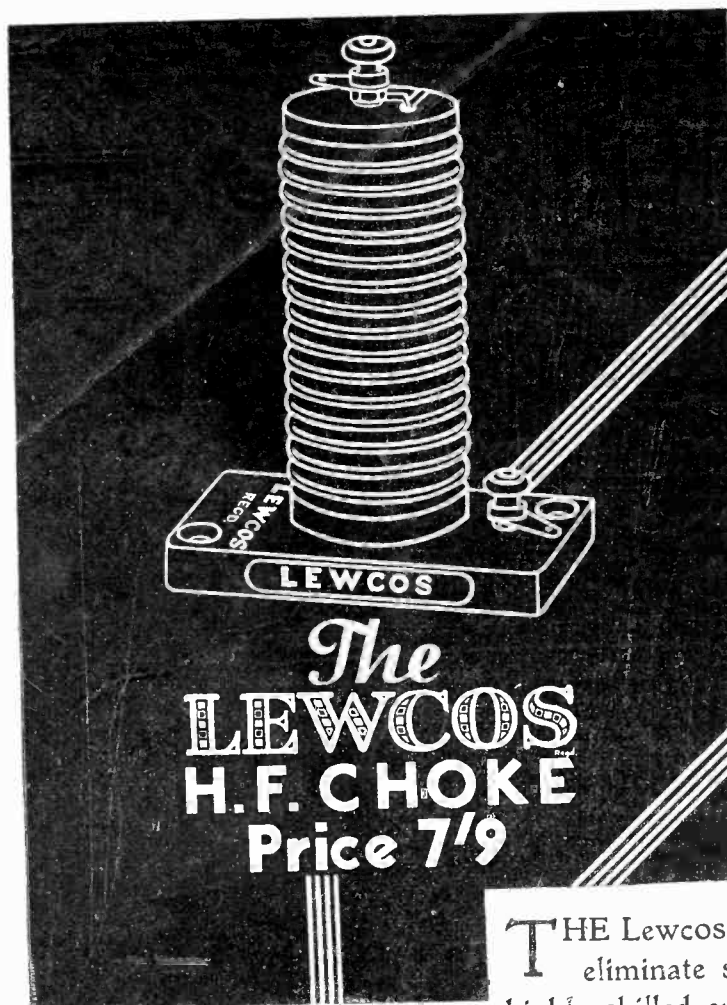
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## A GREAT ADVANCE

THE "P.W." "SUPER-QUAD" HAS ALL THE ADVANTAGES OF THE BEST EXISTING MULTI-VALVE SUPER-HETERODYNE RECEIVER, ALTHOUGH IT DEFINITELY IS EASIER TO BUILD AND OPERATE, AND IS ACTUALLY LESS EXPENSIVE THAN MANY ORDINARY FOUR-VALVERS.

WITH THE "SUPER-QUAD" THE PROGRAMMES AVAILABLE ON YOUR LOUD SPEAKER ARE LIMITED ONLY BY ATMOSPHERIC CONDITIONS, AND THE SET POSSESSES KNIFE-EDGE SELECTIVITY AND CUTS RIGHT THROUGH THE WORST OF JAMMING.



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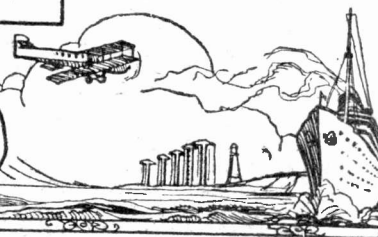


# Popular Wireless

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**CRYSTALS AGAIN  
A CHANCE FOR FILMS  
NO CONNECTION ...  
B.B.C.'s RISE.**

## RADIO NOTES & NEWS

**RADIO'S RECORD  
CAUGHT OUT ?  
GOODWILL—AND  
GOOD BIZ.  
TRAM INTERFERENCE**

### Introductory.

**B**EFORE we get down to the first item on the Agenda I should like to ask what is the joke about me and the Cotswolds, for the last week's mail has been sprinkled with asides, postscripts, etc., about us. It is true that I traipsed those friendly hills with several tons on my back, and thought that I was having a good time and losing weight, whereas I put on three pounds in ten days although I lost sixteen pints of—hem!—sudorific secretion.

But what is amusing you I utterly fail to conceive. Can it be that you think that I can't walk. By gum, the buses round Stow-on-the-Wold know better! Many's the time they've picked me up! However, if you see me on—not in—Dartmoor early in September—it's me.

### Crystals.

**I**'FAITH, a dreary matter for a man with the latest type of self-heating, dole-free, non-pinking, valves in his set! I have by me a collection of nice letters from crystal-fellers; all who have written about crystal sets and have had no acknowledgment—you know who you are!—please be made aware of my joy in hearing from you. There the matter rests.

'Pon me shoul. I don't know what to say to you except that I sincerely hope that things will look up and allow you to afford valve sets. I must ask my opposite number of the Motorbike Monthly what he says to chaps who write to him about the tonic properties of "boneshakers."

Nay, think me not unkind. Ebenezer, but really!—valves and m.c. L.S.'s (if you know what I mean!) are really quite decent nowadays.

### Again Crystals.

**I** AM going to "blue" another paragraph on my collection of crystallographists' letters, because I am old enough—just—to have learned not to despise the old ways of doing things because they are the old

doesn't want to rise and poke the fire, or stretch his legs (or *her limbs*) and who has the time and patience to fiddle with a cat's-whisker, the crystal set is the best, cheapest and most unsociable receiver ever-invented. Now for the storm!

### HERE ARE THOSE "GECOBIRDS"



This is the "super-eight" used by the G.E.C. to introduce their new season's products at a Coventry luncheon, as reported by "Ariel" in his notes last week.

ways. There is much to be said in favour of crystal reception, but I'll not say it, because I think that there is more to be said for valves and L.S.—and, word-hack as I am, I'm blown if I face both ways—at once! But I'll say this. For a single man, or woman, blessed with horny ears, who

mobile and other industries, but I dare say that some trades are not yet alive to the influence of foreign mass production upon our noble selves. I commend this booklet to you, for its message touches us all closely.

(Continued on next page.)

### A Chance for Films.

**W**E still lack the real radio film "talkie." Most of the radio bits in films have hitherto been laughably ridiculous. I once helped a well-known film company to supply a wireless flavour to a Wells film, but when I found that the operator had to dash in and out of his cabin, exclaiming, "My Heavens," and waving a sheet of paper, I sickened of the business because, you ought to know, wireless operators are much better people and know much better—and less offensive—exclamations!

If only I had the time—! (And, moreover, these film companies can't realise that sparks are ancient history!)

### Geddes on Mass Production.

**T**HERE has come into my hands a striking little brochure published by the Pelican Press, being a reprint of an address by Sir Eric Geddes to the "1900 Club" on the subject of mass production. I should not have thought that British manufacturers would need reminding of the vital importance of that principle, considering the radio, auto-

## NEXT WEEK—THE "SUPER-QUAD" CIRCUIT

# NEWS—VIEWS—AND INTERVIEWS (Continued)

## "No Connection With . . ."

E. T. L. (Cobham) asks whether I am the "Ariel" of the "Daily Mirror."

The answer is most positively in the negative. I couldn't hope to aspire to that fascinating style, which I believe to be modelled on that of John Bunyan!

E. T. L. gives two instances of treatment received at the hands of two dealers, one accommodating and the other short-sighted. Well, it takes all sorts to make a world—and the bankruptcy list is full of the names of firms who thought the customer didn't matter.

## The B.B.C.'s "Rise."

I NEED hardly tell you that I have had many suggestions about the uses to which the B.B.C. might put its new wealth to come, some even being to the effect that special broadcasts for Russian consumption should be arranged—a suggestion which was recently made in the House and rejected by the Premier, by the way. I like the idea of A. C. O. (Wood Green) that



the B.B.C. should give serious encouragement to, and make use of, the Esperanto movement. I don't like Esperanto very much—oh, yes! I studied it and achieved some proficiency in it twenty years ago—but I do think that a universal language is a noble conception from several standpoints, and that by its means the use of broadcasting could be multiplied many times and the brotherhood of man thereby be brought near to realisation.

## Radio's Record of Rescue.

SURELY Marconi must be a happy, if not a proud, man when he contemplates the benefits which his inventions have conferred upon humanity, and especially those of security from or succour in the perils which sometimes environ travellers by sea. A careful record has been kept of the number of lives which have been saved at sea by radio since its application to marine work and, not counting what was done during the Great War, the total is about 30,000 lives.

## B.B.C. "Caught Out" ?

THEY are saying that Mr. B. H. Jones, who gave that exciting "escape" talk about his experiences of Turkish prisons, pulled off a good joke at the B.B.C.'s expense.

You may remember that just before the "treasure" was to be dug up Mr. Jones intoned what was supposed to be a magic incantation, but which was really a sentence in Welsh. Mr. Jones repeated



the words for the benefit of listeners, and it now turns out that they meant

"O that Wales had its own broadcasting station!" The cream of the joke is that the whole talk had been approved beforehand by the B.B.C.!

## Germany's Foreign Radio Trade.

GERMANY is supposed to be as near bankruptcy, red ruin, etc., as makes no odds. Dear, dear! As I live and exhale, we've been like that ourselves after every major war we've waged and won. It's a healthy sign and partly confirmed by the fact that Germany's radio exports were 2,980 tons in 1926 and 7,476 tons in 1930;

## SHORT WAVES.

"Why the dickens doesn't the Postmaster-General buy a wireless set?" said the motorist whose car had hit a telegraph pole and pitched him into the ditch.—"Sunday Pictorial."

## THE RADIO BUG.

Little Lennie, spending his first day in the country, watched a big spider. It swung down from a branch and started spinning a web across two twigs.

"Hey, Pop! Come here!" said Lennie. "Whatja want?" says Pop. "Look at this bug, Pop. He's gonna put up a wireless."

Patriotic—The old lady who insisted on having a Scotch wireless set so that she could listen to its "wee Scots accent."

"Nobody could accuse me of being an ethereal type, but I bought a wireless set because it seemed to me the 'nobby' thing to have. But now that I have it it is no use to me at all. . . . Let the grid leak never so wisely, I cannot escape interference."

"Only last night I was dozing over a quintet when an apparently permanent sufferer from tonsils hurled Rhineland potato prices into the middle of a waltz by Brahms."

"Money for jam!"—"Daily Mail."

"Why do you call your grid-bias battery Annie?" asked the amateur's friend.

"Annie volts up to nine," said the amateur affectionately.

Sympathetic wife (to husband who has been trying to tune in his new set): "Got anything, dear?"

Husband: "Yes, a headache."

## MIDDLEBROWS.

When we come to have three programmes for the Middle, High, and Low, it will settle things for two Brows, whom we all can trust to know

At which end of the stick their High and Low Brow tastes begin—

But how about the Middle Brow who's anxious to tune in?

What about the Middle Brow? Who is he, by the way?

What are his tastes? Who knows his tastes? And has he got tastes, pray?

I'd like to know what programme of the harassed B.B.C.

Can pacify the Middle Brow, who's neither You nor Me.—"Daily Herald."

this year they will be about 8,000 tons. Isn't it surprising, too, that we are her best customer for radio goods? In 1926 we took 1,135 tons and in 1930 no less than 2,040 tons; this year looks like bringing the figure to 2,500 tons.

## Mistaken Identity.

G. E. C. (Sheffield).—Jolly good initials! (By the way, pity his name isn't Brooks! Dickens lovers would love to have a "Brooks of Sheffield" amongst us!) G.E.C. writes nicely to absolve me from blame because he didn't get W. L. S. to take notice, and then goes on to ask me for

confirmation of the w.l.'s of Madrid (approx. 30 metres) and Leningrad (approx. 25 metres). I hope that W. L. S. will give the information on his page next week, for I'm hanged if I can find it. G. E. C. wants to know how other readers get on with the drilling of "Staybrite."

## Goodwill—and Good Bye.

IT is announced that the Short-Wave Broadcasting Corporation of New York are planning an international station to carry "goodwill programmes" to foreign listeners. The station will be W 2 X A L, and the frequencies on which it will work are 6040, 11800, 15250 and 24460 (kc.). That is a fine plan, but it is marred as to its transcendent aim by the additional statement that the service is intended to pave the way for greater acceptance of American products abroad! In other words, Europe, including this country, has got to have radio ads!



## The Post Office Scents Profit.

THE fact that the Post office, in the licences now being issued for radio relay exchanges, includes a clause which gives the P.M.G. the right to buy the exchange, shows that in the eyes of that excellent Civil Servant the relay business is serious and likely to be an institution. The clause provides that the P.M.G. shall have the right to buy at three months' notice, but the valuation is not to include compensation for goodwill or loss of profits. If I might offer the P.M.G. a word of advice, I would suggest that his clause will tend to kill the goose that would have got golden eggs ready for him. In a word, he has been in too much of a hurry with it.

## Interference by Trams.

THE Postmaster General says that he does not feel justified in setting up a committee to discuss radio interference by "electric trolley omnibuses." Quite correct! What is needed is direct action, not talk or beautiful reports.

Why doesn't he get Dr. Eccles to tackle the problem? However, he adds that a joint investigation by the Post Office, the B.B.C. and various bus and tram companies is in hand and that he is exploring the legal position of power companies to take action when a consumer causes interference with reception. The thought of a power company solemnly taking action against a tramway system is a rich one. The lawyers must already be licking their chops!

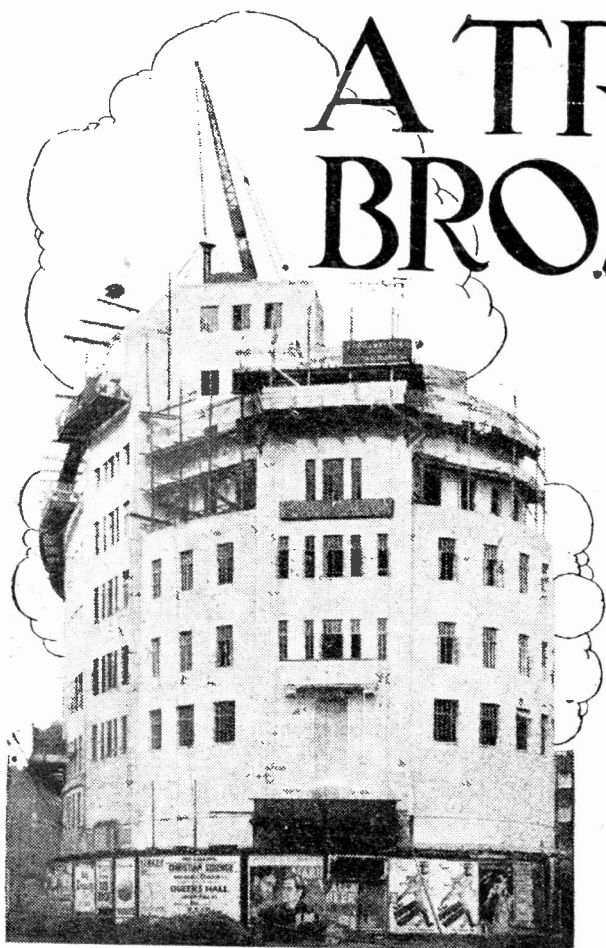


ARIEL.



# A TRIP ROUND BROADCASTING HOUSE

By A SPECIAL CORRESPONDENT.



Broadcasting House, the new B.B.C. Headquarters in Portland Place, London, is now near enough to completion for its final form to be quite clear, and for our contributor to give you an intimate impression of its interior arrangements.

idea is to make the tower of the building the home for the broadcasters and the rest of the building the home for the business and administrative section.

This is a trouble at Savoy Hill, because owing to lack of space and the awkward shape of the various buildings, including the additional offices in several streets just off the Strand, the broadcasting, engineering and administrative sections are all mixed up.

construction of Broadcasting House one can go in at the main entrance, that is the big doorway facing down Regent Street, and the concrete stairs and the spaces for the lift shafts are already *in situ*. These lifts will take one up between the main offices in the "round corner" of the building and corridors which divide this part from the studio tower.

## Lift and Left.

This means that by getting out on any of the five upper floors one can turn *right* to the administrative offices, or *left* to the

(Continued on next page.)

At the beginning of the year I went along to Portland Place when the mere skeleton of Broadcasting House was being erected, and when the huge foundation well was still a mass of concrete mixers and rough brickwork.

I went along on a tour of inspection last week, and what a change! Where there had previously been a frail-looking steel framework and a vestige here and there of the concrete solidity which is shortly to make the finished building, now there is an edifice, the exterior of which appears roughly complete and the interior of which bears clear signs of what the final arrangements will be like.

Further, I have been allowed to see a wash-drawing which has been made in order to give the large staff concerned with Broadcasting House an idea of how things will be planned. This is necessary, because there are so many sub-branches of the design, even down to those people responsible for the final internal decoration and colour schemes.

## The Latest Layout.

The brickwork for the centre studio tower is complete now and, as has already been announced, part of this section is sound-insulated with 4 ft. thick walls and with padded seaweed. These little details and the facts about the miles of ventilation tubing needed throughout the whole of the building are now common property.

What has not so far been made known, is the way in which the studios will be arranged in the tower; and it has not been fully explained that the B.B.C. engineers'

To take one example; at Savoy Hill the News Rooms, where the bulletins, S.O.S.'s, weather reports, and so on are received, is two floors away from the studio where these things are generally announced to all stations. Usually this does not matter, but on rare occasions when some late news is received, it makes a lot of difference and causes an awkward break in the announcements.

## An Example.

In the new Broadcasting House the News Editor's room will be right outside the studio from which such announcements will be given, and there will be a special window through which late news bulletins may be passed while the news is actually being broadcast. This is just one example of the benefit that will accrue and the care that has been taken.

It has been possible to plan the building to suit the business in hand. There was no need, as had to be done at Savoy Hill, to convert a building to studio work. (Part of the present B.B.C. headquarters was, a few years back, a household stores!)

At the present stage of

## KEEPING STRAY NOISES FROM THE STUDIOS



These men are busy making Broadcasting House sound-proof, so that no unwanted noises will get into the studios. A tremendous amount of dried seaweed is employed for this purpose.

## A TRIP ROUND BROADCASTING HOUSE.

(Continued from previous page.)

studio block. If you are a member of the general public going in to listen to one of the concerts in the main 1,000-seat studio, then you will not go in at this main entrance, but in either of the two side entrances where stairs lead down to the main floor of the concert hall and up to the gallery.

### The Disappearing Piano

This large studio and its gallery, organ and special lighting and acoustic arrangements have already been described. What is not generally known is that the B.B.C. may have plans in mind for the use of this hall for entertainment work, because it is fitted with entirely separate ventilation apparatus and thus conforms with the L.C.C. regulations for the ventilation of public concert halls.

for the Publications dept., another concert room, and a band room. In other words, there will be no studios immediately above the concert hall, and so no possibility of sound leakage.

### Sir John's Suite

On this same floor to the right, outside the tower and immediately above the entrance hall, is the Council Chamber which corresponds to the Board Room of an ordinary Company. Above it is Sir John Reith's office, or rather suite of offices, for, according to present plans, there will be a large office and two smaller ones for the secretaries.

The two floors above this, in the tower, will be taken up with studios, waiting-rooms, a silence cabinet and artists' dressing-rooms. Above this, again, is the music library.

On this floor, office space at the main corner of the building (that is, directly above Sir John Reith's office) will be reserved for the administrative section. Above again, in the tower are studios, two store rooms, three listening cabinets, and a large waiting-room for the artists. The ceilings of all these rooms are roughly on a

## STARTING YOUR RADIO ANTIQUE COLLECTION.

Some practical hints on the obtaining of old gear.

IN a previous article in this journal I endeavoured to illustrate how the collecting of radio antiques could be made to be both pleasurable and profitable.

We will suppose for a moment you have decided to collect the various pieces of apparatus which I loosely described as "detector apparatus." At this point I ought to say that the collection of such apparatus would not be particularly interesting if it just consisted of the coherer, crystal detector, and various types of detector valves, so I mean types of apparatus connected with detector stages to be included in this category.

### What To Look For

I have got a catalogue from Messrs. Electradix Radios, and they have a good selection of the old types of valves which are worth collecting, including a Marconi-Round valve—this is a real old-stager. They have also coherers and various types of crystal detectors. A look through your own junk box would most likely produce some sort of a crystal detector.

There is a definite limit to the age of goods you can buy from such firms, however. Naturally, it is not in their trading interests to hold stocks of apparatus that no one is ever going to require. Therefore, for the real old "antiques" we must look elsewhere.

This is where our real difficulties begin—but it is by far the most interesting part of all, so don't shun the task.

### No Fakes Yet

I have found auction sales of electrical and radio material to be oftentimes fruitful in the matter of picking up quite old material at a trifling cost.

It is quite impossible to say where the very old types of apparatus can be found, but no doubt it will be unearthed when the owners get to know other people are interested to buy certain types.

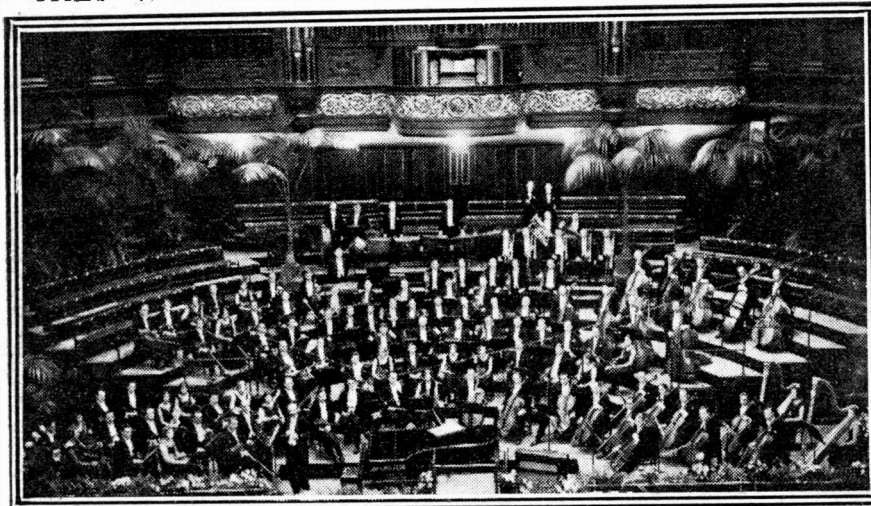
Now, then, about recognising antiques. At the present time this should present no difficulty at all, for the collecting of radio antiques is still in such early days that the "faker," who generally invades when there is something to be made from his craftily made "fakes," has hardly had time to accustom himself to the job of making "new radio antiques."

### Those Old Books

In conclusion, I think the best advice I can pass on to you is to procure a very old electricity and radio book, either from a second-hand book dealer or from your public library. It will be found chock-full of illustrations of apparatus in use then, and will act as your guide to genuine antiques. I can recommend "Experimental Researches in Electricity" by Michael Faraday (this book was published about 1839). Also "Fifty Years of Electricity," by Fleming. Also "The Principles of Electric Wave Telegraphy," by Fleming.

In all cases, see the antique you propose buying is in really good condition, and as far as ever possible in working order.

## THEY WILL SOON MOVE INTO THEIR NEW HOME!



This is the famous B.B.C. Symphony Orchestra at the Queen's Hall. When Broadcasting House is finished—and it should not be very long now—you will be able to hear them from the new studios in this colossal building.

This studio takes up three floors, of course, and the floor of the studio is on the lower ground floor of the building. Behind it is a buffet lounge which will be available for the public, and which is also reached by another flight of stairs from the ground floor.

Cinema practice has been studied in the design of this hall. For instance, there is a lift for the piano so that it can be dropped down out of sight when not required.

### Stopping Sound Leakage

Down below the big concert hall is a studio with a gallery, a waiting-room, listening-room and silence cabinet. In the front part of the building in this sub-basement are the heating boilers and some of the machines connected with the ventilation apparatus.

We climb upstairs, for the lifts are not yet ready, to the floor above the concert hall. This floor is to be used for offices

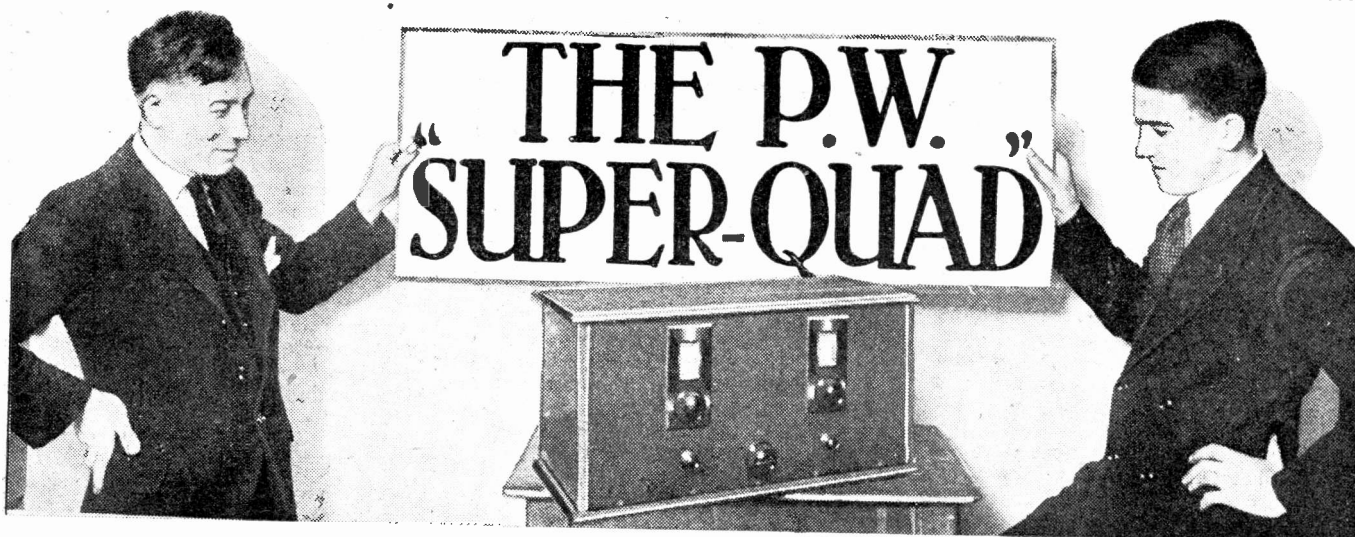
level with the lower edge of the huge sloping roof which crowns Broadcasting House.

Actually in the roof itself is a very large studio now in course of construction which, according to present plans, will be nearly as lofty as the giant concert hall in the semi-basement. Quite possibly the windows which are provided in the studio will actually look out, through the roof, to the sky, and this will be the only studio which has any connection with the outside world so far as sound insulation is concerned.

At the extreme end of this new studio is a listening-room, and on the other side is a large room which can be used as a subsidiary studio for the use of the announcer, or as a waiting-room.

Within the next few months, Broadcasting House will be nearing its final stages of completion, and it is quite on the cards that before the end of the year the first broadcast will be heard from some of the new studios.





**A** DIAL movement of two degrees and the powerful local disappears—that is an indication of the station-separating qualities of the “P.W.” “Super-Quad”! And the number of programmes that it can pick up is limited only by atmospheric conditions.

Nevertheless, this latest “P.W.” achievement in set design employs only four valves, and is as easy to assemble as many ordinary “twos.” And despite its razor-sharp selectivity no previous experience is necessary for the manipulation of the few controls.

Needless to say, such virtues as these are not to be found in any standard hook-up copied from a dog-eared book of reference; indeed, the “Super-Quad” is entirely new, and comprises a four-valve super-heterodyne circuit embodying several completely original features.

Of course, the super-heterodyne principle itself is by no means an innovation. As a matter of fact, it was introduced as far back as in 1919. For one or two years it enjoyed immense popularity because it was then the only known method of obtaining really effective high-frequency amplification.

But when Hazeltine, in 1923, invented his method of neutralisation, the ordinary H.F. valve came into its own and the super-het. fell into the background.

#### First Flickers

You see those early “supers” necessitated the use of at least six or seven valves, and the valves of that period were such enormous L.T. current eaters that the L.T. accumulator would be called upon to deliver as much as five amperes!

However, soon after dull-emitter valves came along, and that eased the situation from this point of view to a considerable extent. And when, four or so years ago, the S.G. valve ap-

Some preliminary remarks concerning a triumph in radio-set design—a full-powered, super-heterodyne receiver which uses only four valves.

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

peared on the market, it gave the super-het. a further lease of life.

But the principle never looked like regaining its erstwhile popularity. It is true that early this year the super-het. leapt up a bit in public favour, but I firmly believe it could never have attained any real prominence so long as it evinced itself as a ten-year old idea with the mere disguising trimmings of modern components.

#### A New Criterion

Until quite recently it has not been possible to make a super-het. having any pretensions to efficiency without using, at the very least, six valves.

But even with our present-day valves, that means much more L.T. and H.T. than

most of us can afford, quite apart from the question of the initial cost of the valves themselves—no small item this in these days of trade depression and shallow pockets!

And, as “P.W.” caters neither for millionaires nor for owners of electricity power stations, we never gave a single thought to the production of a “star” “P.W.” set of the six-valve super-het. class.

Nevertheless, we have given very great thought indeed to the super-het. principle. But instead of rushing in with a standard multi-valve version, we preferred quietly to pursue intensive research with a view to the production of something sufficiently inexpensive to build and run and sufficiently novel to justify detailed description in our pages.

The magnificent result is the “P.W.” “Super-Quad,” a receiver which we can justifiably claim to comprise a stepping-stone in the technique of radio-set design.

For the first time full super-het. qualities are available in a simple four-valve assembly and a new criterion of performance is set up.

It is in this last that lies the “Super-Quad’s” main claim to fame, rather than in the perpetuation of the super-het. principle.

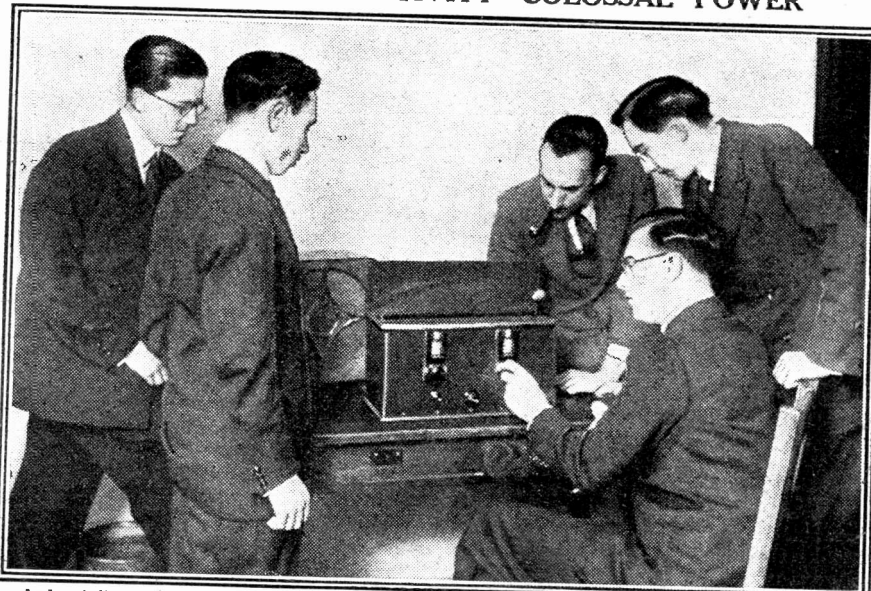
#### Beats The Lot!

There is no other four-valve set in existence (and this is fact, not an expression of personal opinion), capable of such power and selectivity, that can approach it even remotely for simplicity in assembly and operation.

But while it will no doubt retain its superiority for some time, I do not think it desirable that the future should build on a “Super-Quad” foundation. Not because in itself the “Super-Quad” is not an extraordinarily

(Continued on next page.)

### STARTLING SELECTIVITY—COLOSSAL POWER



And yet it looks no more complicated than many ordinary two-valve sets! Certainly it is simplicity itself to assemble, wire-up and operate, but it gives results which will astound those who have not before encountered a really effective “super.”

## THE "P.W." "SUPER-QUAD"

(Continued from previous page.)

attractive proposition—it very definitely is—but because it takes you as near as can be to the perfect practical presentation of the super-heterodyne principle.

That does not indicate that it is a perfect set—we have a long, long way to go before we can approach that ideal—but, while radio in general must have stretching before it an endless road of progress and advancement, there is pretty strong evidence that we have now explored nearly the whole of the super-het territory.

### Faking the Frequency.

There are very clear physical indications of this, although I do not propose to weary you with them now. Suffice it to say that it is not probable that future generations will tolerate radio receiving apparatus that is fundamentally dependent upon an oscillating condition for its functioning.

But such are the limitations of our present conditions that a good super-het. is indubitably deserving of a place beside the best of any other kind of receiver even in point of quality or reproduction while, as we have previously mentioned, its selectivity and sensitivity will beat any other outfit, valve for valve and component for component.

One of the greatest disadvantages hitherto associated with super-heterodyne receivers has been largely eliminated in the "Super-Quad," although readers unacquainted with the super-het. principle will not fully appreciate this point unless I say a few words as to what this principle is. Well, here goes:

There are two difficulties associated with H.F. amplification; one is that at least one tuned circuit is needed for each tuned H.F. stage, and the other that the amplification at different wave-lengths tends to vary, the efficiency increasing as the wave-length increases.

From this it will be seen that simpler and more effective amplification should be possible if all the stations, whatever their wave-length, could be converted to the one frequency or wave-length after reception, but before being passed to the H.F. amplifiers.

And this is what is done by the first detector valve and the oscillator of a super-het. A continuous oscillation is set up and made to heterodyne the received energy. This produces a beat frequency corresponding with the wave-length of the H.F. amplifier or "intermediate H.F. amplifiers," as they are termed.

There is a second detector which precedes the L.F. valves in the usual way.

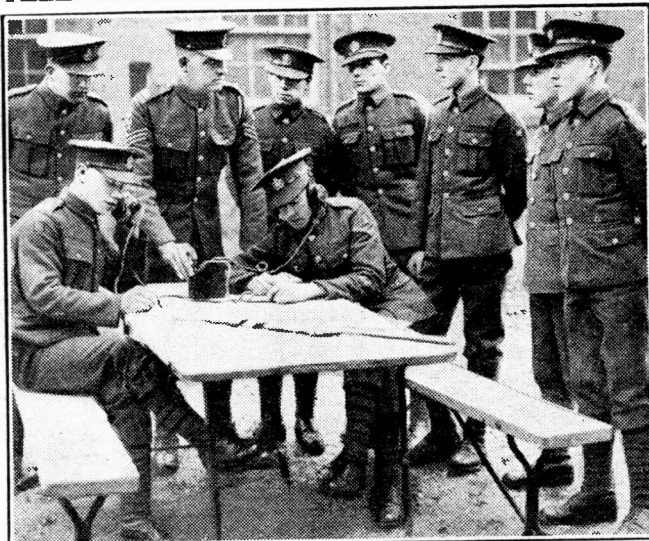
Super-hets. tend to be unduly "noisy" for two reasons. Firstly, there is continuous oscillation and a consequent over amplification of both etheric transients and noises inherent in valves. Secondly, there will be loud squeals and howls as you tune in distant stations owing to the existence of a powerful local heterodyne, but these noises cease when you are finally tuned in to a station.

However, the first item of noises remains. It is initially reduced very considerably in the "Super-Quad" for the obvious reason that this wonderful little set employs only four valves as against the six, seven, eight or nine hitherto deemed essential.

A second force working against noisy "background" in the "Super-Quad" is the carefully chosen intermediate frequency. You see, the lower the frequency of a powerful H.F. amplifier the more likely is it to transmit the "higher audio-frequency" valve noises and atmospheric transients.

But you cannot increase the intermediate frequency in ordinary circumstances without simultaneously decreasing the sensitivity. And that is where the super-het. rests on the horns of dilemma, as it were.

## TELEGRAPHY TRAINING FOR TERRITORIALS



Territorials learning to operate a telegraphic "tapping key" under the supervision of a Regular Army non-commissioned officer.

I cannot claim that we have done anything more than compromise in the "Super-Quad," for we haven't, but, by carefully choosing our values, we have supplemented, in no small measure, the quietening effect of a striking valve reduction.

### Two Vital Factors.

I have not yet even touched upon two of the most vital factors contributing to the success of the "Super-Quad," but I am going to leave the detailed disclosure of these for Mr. Rogers, who will be discussing the "Super-Quad" circuit in our next issue.

There is another disadvantage inherent in many forms of super-het. receiver, and this is generally termed "repeater" interference.

It evinces itself in the reception of the same programme at two different points.

on the oscillator tuning dial or even the reception of two stations on the one setting. And often further "repeat points" are caused by harmonics generated by the oscillator.

In "straight" super-het. designs these recurrences tend to lead the uninitiated into believing he is getting at least twice as many stations with his "super" as is really the case.

He turns the dials very, very slowly and first hears speech and then music, followed by different speech and different music as he tunes in and out of the stations. But the odds are that when he runs through his "repeaters" he does not recognise many of these as duplications of items previously heard!

### He Hadn't Noticed!

I experienced a very amusing instance of this not so long ago. A friend of mine, who knows little or nothing about the technical aspects of radio, built himself a six-valve super-het. One evening, full of enthusiasm, he invited me round to hear the thing.

Admitting that it was undoubtedly "very noisy," he began to "rapturise" concerning its programme pulling powers. "Gets at least ninety stations any night," he burred.

He switched the thing on and started to tune it in. But he hadn't run through many tens of degrees before I spotted that the contraption was simply bristling with "repeaters." One programme seemed to have half-a-dozen settings. Instead of dozens of different stations, he was merely getting the same three or four stations at dozens of different dial readings!

I am not going to say that the "Super-Quad" is completely innocent of "repeaters," but it very undoubtedly is vastly superior in this respect to many super-hets. using fifty-per-cent and more valves.

And when all is said and done, and I have been completely frank, the "P.W." "Super-Quad" remains a wonderful proposition, a set with no existing equal for all-round attractions and one that will hold its own for many years to come.

### The Waiting Crowd.

In operation it is a most fascinating little caseful of concentrated effectiveness. To look at, it has a bland air of almost unbelievable simplicity, there are no metal screens or anything at all savouring of complication.

The wiring does not have to be carried out with extreme care, and the whole job can quickly be completed by anyone using only a screwdriver and a pair of pliers.

And yet, when you switch it on the whole of the world's busy ether seems to crowd closely round as though drawn in by a colossal magnetic power.

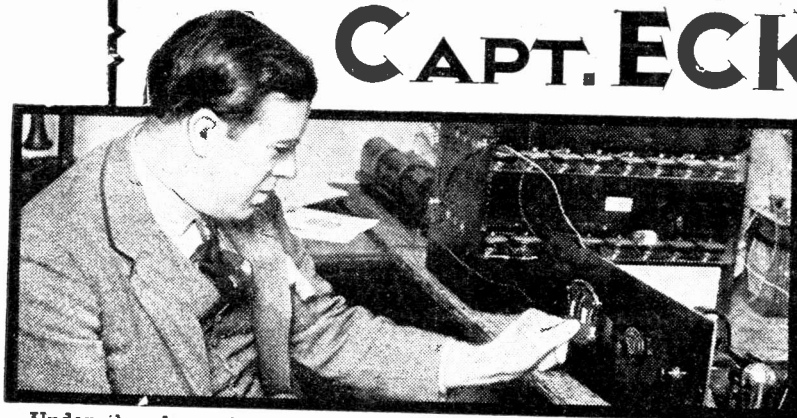
Stations you've never even heard of before simply tumble in, and dozens of alternative programmes of real entertainment value, and at excellent quality, lurk behind the dials waiting to pounce through the loud speaker the moment you tune to them.

### NEXT WEEK

Full details of the "P.W."

## "SUPER QUAD" CIRCUIT





# CAPT. ECKERSLEY'S QUERY CORNER

OBTAINING SMOOTH REACTION—  
NO AERIAL OR EARTH—ALU-  
MINIUM OR TIN?

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers. Don't address your questions to Capt. Eckersley, however—a selection of those received by the Query Department in the ordinary way will be answered by him.

## Obtaining Smooth Reaction.

A.S.R. (Romford).—"On my det. and L.F. set, I recently found that with the L.T. battery reversed I get much better reaction control. In so far as I can discover, this is not likely to cause trouble except that G.B.+ is now joined to L.T.+ Is this likely to cause any damage?"

A great many detector valves work more effectively if their grids are biased a little positively. No harm can be done.

An optimum point may be found as follows:

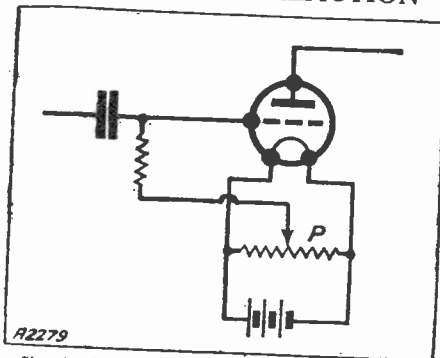
P in my diagram is a potentiometer. Obviously, as the slider is moved one way or another more or less "positive" is applied to the grid, and very fine adjustment of the bias is thus provided.

Make P of high resistance so as not to run-down the low tension battery unduly.

## No Aerial or Earth.

B. E. C. (St. Albans).—"With my three valve receiver I find it practically impossible to cut out the local station. Judge my surprise when recently I found that the

## FOR SMOOTH REACTION



Showing how a potentiometer should be connected to enable the grid potential to be gradually varied.

tuning of the local station was quite sharp, but it was impossible to get foreign stations.

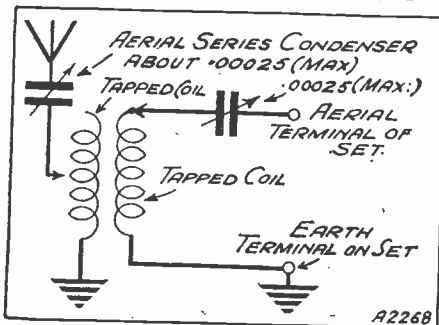
"An examination showed that both the aerial and earth leads had been disconnected from the set. This proved to me that my real trouble was due to direct pick-up, and that possibly screening was the only cure. If this is the only solution should I screen the whole of the set, or only the tuning circuits?"

Needless to say, I have already tried several types of wavetraps."

You may be suffering slightly from direct pick-up, but that is not the whole explanation.

Let me illustrate what I am trying to explain by an analogy. There are many sounds in the air now which you cannot hear.

## IMPROVING SELECTIVITY



This diagram illustrates the tips given by Capt. Eckersley for improving a set's selectivity.

You cannot hear the bees in South Africa nor the buses in Pimlico, nor the conversation of your next-door neighbour while you are in St. Albans. You could hear me talking to you if I sat in a chair the one side of your fireplace while you sat in another the opposite side. Thus you select a particular transmission in terms of sensitivity.

If your ears were now made a million times more sensitive you would still only hear me in your room—very, very loud. But if I stopped talking you would be able to hear if not the bees in South Africa, perhaps the buses in Pimlico.

If your set is very sensitive by having an outdoor aerial close to Brookman's Park you only hear Brookman's Park when that station is transmitting, but when that station shuts down you can get foreign stations.

When your set has no aerial and earth it is much less sensitive and can hear nothing but Brookman's Park and, being insensitive, your tuning is apparently sharp. Thus a big aerial makes a given set unselective by making that set too sensitive for a very powerful local station.

There is no actual cure which gives your set immediately both selectivity and sensitivity to any degree. In general, I should advise reducing the size of your aerial, screening your set, arranging a series condenser

of maximum value 0.00025 and using a coupled circuit as shown in my sketch.

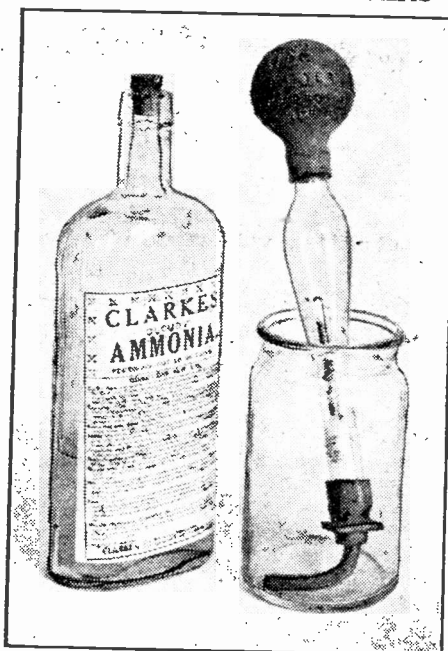
Experiment to find the best coils. Use plug-in if you like for wave-change.

## Aluminium or Tin?

B. H. J. (Deal).—"In a new receiver which I propose constructing in the near future the Screen Grid H.F. valve, aerial coil and condenser should be enclosed in an aluminium screening box. As I already have a suitable box of tinned iron, would it be permissible to use this in place of the original specified type and what effect would this have on the receiver's performance?"

I do not think the material of the screening box will have much influence on performance, always provided iron is tinned and the fields created by the coils are not too intense in the neighbourhood of the metal, i.e. provided the coils are a fair distance away from the sides of the box.

## USEFUL FOR "CHARGERS"



Those who do their own charging will find these two items—a bottle of ammonia and a hydro-meter—very useful. Ammonia, as you probably know, is splendid for "Killing" spilt acid and it may easily save you buying a new tablecloth!

## INTRODUCING THE "SUPER-QUAD."

By THE EDITOR.

"P.W." once again leads the way by producing an entirely novel set design of outstanding merit.

CONSISTENT readers of "P.W."—and they number over 128,000—will remember with little trouble some of the more outstanding innovations we have introduced to the Radio public during the last two or three years. We might cite as one or two examples the "Brookmans Rejector," the "P.W." Differential Reaction system, the "Antipodes" Adaptor, Flexi-Coupling, the "Contradyne," the "Extenser," etc., etc.

These names, taken at random, will easily awaken memories in the minds of "P.W." readers, just as easily as will names like "Titan," "Magic," and "Comet" remind them of receivers which have basked in the full glare of the limelight.

### Some Old Friends

There is plenty of evidence to show that the Brookmans Rejector proved a trapping device that achieved 100 per cent. efficiency on both waves without any reduction in signal strength; while the "P.W." Differential Reaction system is now in universal practice.

Thousands of "P.W." readers have learnt by experience the value of the Antipodes Adaptor, the first short-wave unit of its kind, now copied the world over; while the system of Flexi-Coupling proved to constructors the value of simplified selectivity with increased power. We mention these few of the many successful innovations we have introduced to our readers during the last two or three years in order more satisfactorily to bring to your notice another outstanding innovation—the "P.W. Super Quad."

During the last few months the Research department has concentrated on problems connected with the Super-Het—not the sort of problems which are inevitably linked with the old-fashioned Super-Het systems, which can well be left in the limbo of "out-of-date" systems—but the sort of problems which must be faced, and solved, if modern super-het ideals are to be successfully attained.

### The "P.W." Way

We have watched with interest—and, he admitted, with no little amusement—the revival of interest in the old-fashioned super-hets, and although, in deference to public demand, we have been sorely tempted to turn out "P.W." versions of these old-fashioned super-hets, we have resisted temptation. Not without difficulty, be it added, for many readers have written to us during the last few months, inquiring why "P.W." did not cater more extensively for the revived interest in supers. But as we have said, we felt we should not be serving our readers in a really satisfactory way by inducing them to construct super-hets on old-fashioned and, consequently, unsatisfactory lines; we preferred to leave the subject severely

alone until we had some definite and new contribution to offer to the super-het problem.

That consideration has now been very well prepared by the Research department; we feel confident we can now offer our readers something new and something which will have the widest possible appeal.

This "something" is embodied in a receiver which we have named the "P.W." Super Quad.

To begin with, the Super-Quad has one very important merit, it does not require a miniature power station to operate it. And if you know anything about the average type of super-het you will realise

for our claims, and would ask you to pay particular attention to Mr. G. V. Dowding's article on the "Super-Quad," which is printed elsewhere in this issue.

\* \* \*

It was pointed out in the "Daily Telegraph" the other day that England is at present suffering from an unprecedented invasion of American-built wireless sets.

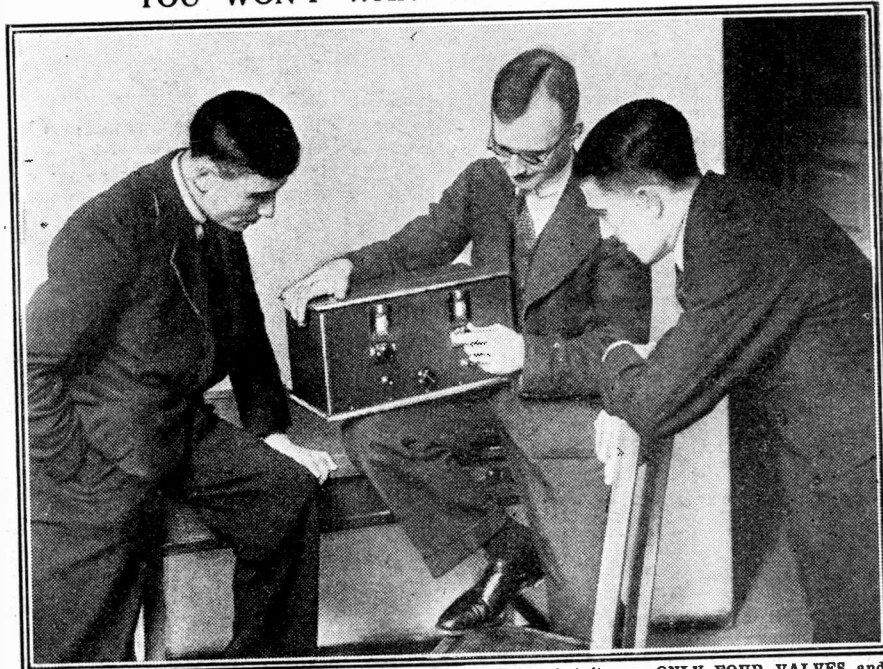
"Radio mass-production in America has received a series of blows which are impelling the manufacturers to dispose of their huge surplus stocks at whatever price they can fetch," wrote a correspondent in that paper, "and the result in England is that home manufacturers have at the moment to face severe competition from across the Atlantic."

### Those Yankee Sets

The situation was discussed with a representative of "The Daily Telegraph" by Mr. R. Milward Ellis, the president of the Radio Manufacturers' Association.

"There is no doubt," he is reported to have said, "that American manufacturers just now are having a very bad time.

## YOU WON'T WANT A POWER-STATION!



The P.W. "Super-Quad" is a full-power super heterodyne set but it uses ONLY FOUR VALVES and does not call for a power station H.T. supply!

the importance of this point. It brings the super-het definitely into the sphere of practical economics in radio design, and that means a good deal in these hard times.

Further, you can build the "Super-Quad" yourself. You don't have to be an expert mechanic, or a millionaire. The set, in short, represents a break away from conventional practice, and we devote part of this editorial article to bringing it to your notice because we emphatically feel that the "Super Quad" constitutes a definite and notable triumph in more satisfactory super-het design, and may well lead to the development of a new technique in the general design of simple but efficient multi-valve designs.

### Try It For Yourself

With these few words we leave you to investigate for yourself the justification

America's existing production-capacity is ten times as great as her normal home requirements.

"In New York, when I was over recently, the ordinary public was able to buy many 'proprietary' types of sets at half their listed prices, and the obsolete sets are now coming into England. Naturally, we resent this influx of dumped radio sets, the product of a system which is already proving ruinous to the Americans.

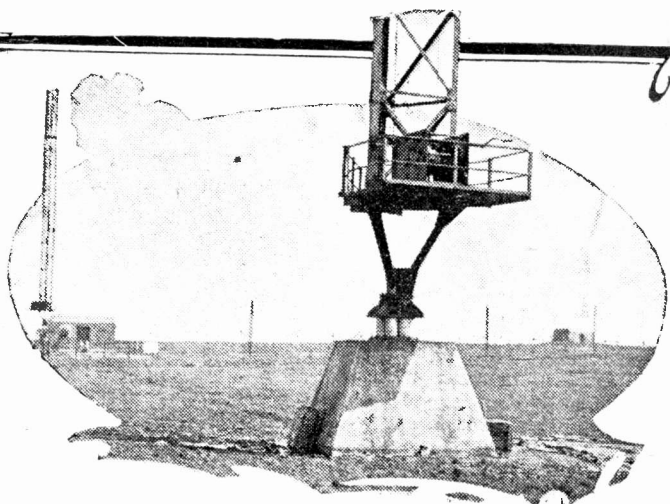
"But fortunately most American sets possess grave disadvantages from the point of view of the English market.

"The mass-produced American set of seven or eight valves has working and replacement costs three times those of the British sets, and although this under-selling is for the moment dangerous, we have good reason to believe that the British set will win in the end."



# WITH THE B.B.C. *in the* NORTH

No. 6. Manchester—The Most Up-to-Date  
B.B.C. Centre.



UNTIL the B.B.C. moves its London headquarters from Savoy Hill to the new building in Langham Place the palm for the most complete and the most modern broadcasting centre in the British Isles must go to Broadcasting House, Manchester.

Of course, there are fewer studios at the North Regional headquarters than at Savoy Hill, but when you inspect the design and equipment at Manchester you have to admit that it is a case of what Manchester has to-day London will have to-morrow. (Chorus of "As usual!" from Lancashire.)

## Quite a Large Staff.

North Regional Broadcasting House is a handsome building in Piccadilly, the heart of Manchester. The ground floor occupied is by a bank, the four floors above by the B.B.C. Counting everybody, from the Regional Director to the office boy, there is a staff of about fifty people here.

For the past two or three years they have been preparing for the day when they would have to provide regular Regional programmes for transmission from the North Regional high-power station. Now, with the opening of Moorside Edge, that day has arrived.

Let us, in imagination, strip the façade from Broadcasting House so that its interior is revealed like one of those ingenious sectional drawings which appear in pictorial papers to illustrate the "innards" of the latest wonder in hotels.

## The Control Desk.

In a room high up in the building we see two or three engineers sitting at a huge control desk. One of the men is watching a meter and occasionally, when the needle moves, he adjusts a knob. He is controlling the National programme, which is passing through this room en route from London to the National transmitter at Moorside Edge. Another engineer is working similarly at another section of the control desk; he is controlling the alternative programme.

The National programme arrives

An intimate view "behind the scenes" at the North Regional headquarters is given in this article of our series by Leslie W. A. Bailey describing B.B.C. stations in the North.

along one of the three London-Manchester land-lines which terminate at this desk, and after amplification it is transferred to one of the five lines which run (underground) to Moorside Edge, eighteen miles away.

The amplifiers are in a room adjoining the control-room. They are remote-controlled from the big control desk. Everything,

indeed, has been robotised. The familiar type of switchboard with a maze of plugs and jacks has been swept away. Instead of juggling with plugs and switches the engineers at Manchester press buttons and the robot control board does the rest.

## Permanent O.B. Centres.

There are eighteen concert halls and other "outside" places in Manchester permanently connected to the control-room by land-lines, and the engineers can get "through" to any one of them in a twinkling by dialing a code number, just as you dial on the automatic telephone. This is indeed a marvellous control-room, far and away the finest in the country.

The giant "No. 1" studio, lower in the building, is two floors deep and can be entered either from balcony level or by doors leading on to the studio floor, where, as we watch, the Northern Studio Orchestra is at work round the microphone.

They, at the moment, are the Regional alternative to the National programme; from this microphone their music flashes upstairs to the control-room, then along one of the lines to Moorside Edge, to the North Regional transmitter, which flings it far and wide through the ether.

## Adapting Music.

Incidentally, since the formation of the Studio Orchestra last April in succession to the late lamented Northern Wireless Orchestra, the music department at Manchester has had a busy time transcribing shoals of music. Composers do not write for combinations of nine players, so all the music has to be rearranged. Most of this work is done by that able pair Messrs. Morrison and Fogg, a talented team of whom more anon.

Higher up in Broadcasting House there is a smaller studio, "No. 3," where a rehearsal of the Children's Hour is in progress. Miss O. B. Schill came fresh to the B.B.C. three years ago, and the general supervision of this feature is one of her several

(Continued on next page.)

## MANCHESTER LEADS THE WAY!



A view of Broadcasting House, Manchester, which is, at the moment anyway, the most complete and most modern broadcasting centre in Britain

## WITH THE B.B.C. IN THE NORTH

(Continued from previous page.)

duties. Her able lieutenant is Miss Muriel Levy, who takes charge of the programme day by day in the studio, and has also blossomed out in North Regional programmes as a radio dramatist.

Wind machines and water tanks indicate that the room adjoining "No. 3" is the effects studio. As a matter of fact, most of the "noises" for radio plays are now obtained from gramophone records, and there is a double turntable in the effects studio for this purpose.

### Elaborate Control Panel.

In a room on the floor below an elaborate dramatic control panel enables Victor Smythe to juggle with the cross-fading so beloved by certain radio dramatists. Smythe, who, after sampling the stage, the sea, and the cinema, joined the B.B.C. in its hectic early days at Manchester, is not of the extravagant school, however, and prefers to pin his faith to comparatively simple methods of play production.

"No. 2" studio is a cosy little study where people give talks, which are organised by H. J. Dunkerley, formerly Station Director at Liverpool. Then there is "No. 4," which was once an echo-room.

Our Broadcasting House with the front off also reveals a canteen, an elegant artistes' waiting-room, a board-room where the Programme Board meets weekly to discuss future programmes, and numerous offices containing typewriters, filing cabinets, and charming young ladies.

### Manchester Personalities.

A spacious room is occupied by E. G. D. Liveing, the North Regional Director, in whose hands broadcasting in the North seems likely to flourish. In another there is J. B. Clark, his principal assistant, who came to Manchester from Cardiff several years ago.

And then there is that gifted musician, T. H. Morrison, who made the Northern Wireless Orchestra such an enormous success. He is now Music Adviser to the Midland Region as well as Music Director (there is apparently a subtle distinction) to the North Region.

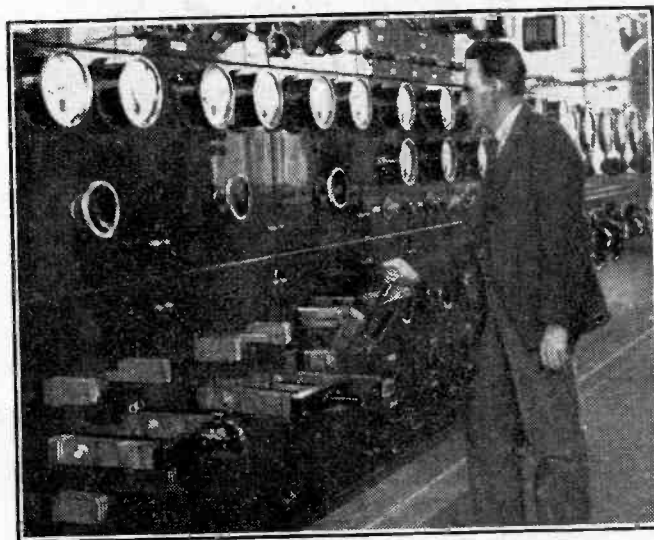
Another tower of strength on the musical side of North Regional programmes is Eric

## TELEVISION'S HIGHEST LABORATORY

Details of the N.B.C.'s latest television venture.

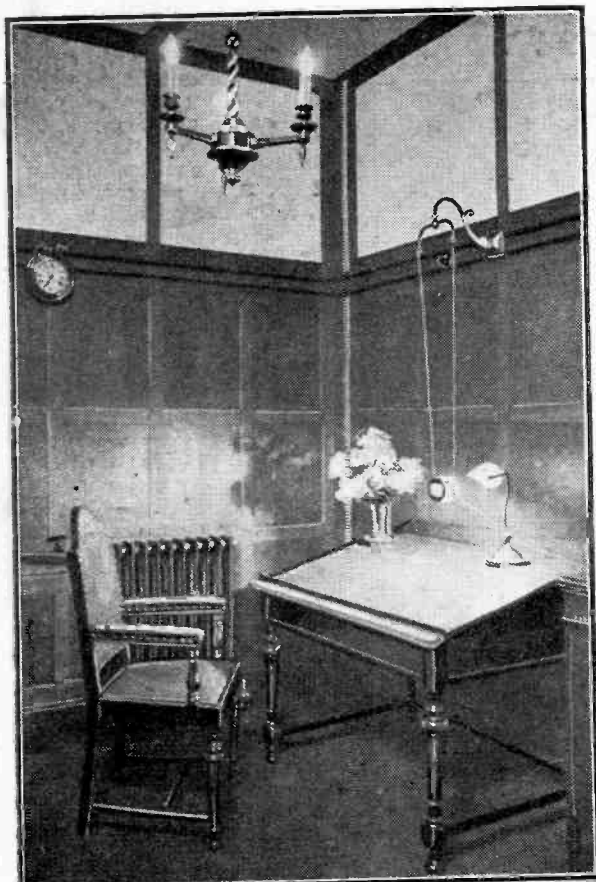
ARRANGEMENTS have just been completed whereby the National Broadcasting Company of America will convert the eastern half of the 85th floor of

## SWITCHING ON AT SLAITHWAITE



An engineer closing the filament switch at the North Region Station.

## "MIKE" IN SERIOUS MOOD!



This is the Manchester Talks Studio. We believe some listeners do not approve of such things!

Fogg, the official accompanist at Manchester. His ability as a composer is receiving outstanding recognition by the acceptance of his new choral work, "The Seasons," for performance at Leeds Musical Festival in October.

### Programme Arranging.

The Programme Board consists of the officials I have named, and also E. L. Guilford, the former Nottingham Station Director, who now does the routine work of programme arranging and also maintains contact with the Press in the North of England; G. P. Fox (Leeds representative); and the two announcers, W. G. M. Shewen (who was formerly at Newcastle and Hull) and Holgate Morris (a recent recruit to broadcasting).

The Newcastle Station Director, G. L. Marshall, also visits Manchester from time to time to take part in the programme discussions.

## NEXT WEEK

The article in this series will concern  
Slaithwaite.

the Empire State Building in New York into the world's highest television laboratory. The height is approximately 1,000 feet above street level.

The new sight and sound studios atop of the Empire State Building will feed directly into aerials supported by the airship mooring mast, the top of which is 1,250 feet high. There are no very tall buildings in the vicinity, so the location should be ideal; only tests will reveal whether it is or not.

M. H. Aylesworth, President of the N.B.C., in making the announcement, said that the reason for the acquisition of the new site was for the purpose of bringing television out of the laboratory and beginning experimental sight and sound broadcasts.

He predicted that after about a year of intensive experimental tests under actual working conditions, television would be developed for public use.

### Cathode-Ray System.

"This does not mean that it will be a hundred per cent perfect," he said, "but television will at least have reached that stage where refinements of technique will be required rather than the development of new basic principles."

This, together with other public statements which have been made recently by R.C.A. officials, is taken to mean that, after several years of work in secret, the R.C.A. expect to have in about a year's time a system of television which will be acceptable to the public. No details of this system are at present known, except that it is a cathode-ray system, for the development of which Vladimir K. Zworykin has been largely responsible.

A. D.



THE admittedly wide popularity of the three-valver must not lead constructors to imagine that good loud-speaker reception is impossible with a smaller set. This is very far from being the case.

As a matter of fact, the foundation of the three-valver's popularity was laid years ago when receivers in general were a long way behind those of to-day in efficiency.

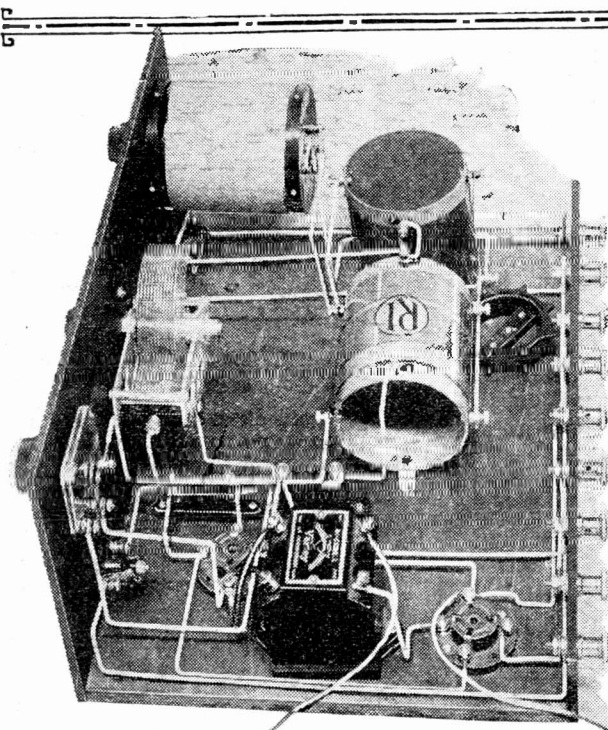
#### "Two" Equals "Three."

Indeed, so greatly has the technique of receiver design advanced, and so improved are our components and accessories, that a two-valver of the present can provide a performance quite equal to that of the earlier "three."

Had we been able to start in with apparatus of to-day's standard, there is no doubt whatever but that it would have been the "two" that achieved the greatest hold on the affection of constructors.

However, as it is, there is no inconsiderable section of the "wireless fraternity" who swear by the nimble "two" to the exclusion of all others. And when there are outfits of the calibre of "P.V." Junior in the class, who is there to say these enthusiasts are not getting their fair share of the programmes that pulsate in the ether nightly?

"P.V." Junior will give many everything they want, and at excellent loud-speaker strength, too. The Nationals and Regionals will roar in at fine quality, and there will be a healthy sprinkling of distant stations to provide ample alternatives to British broadcasting.



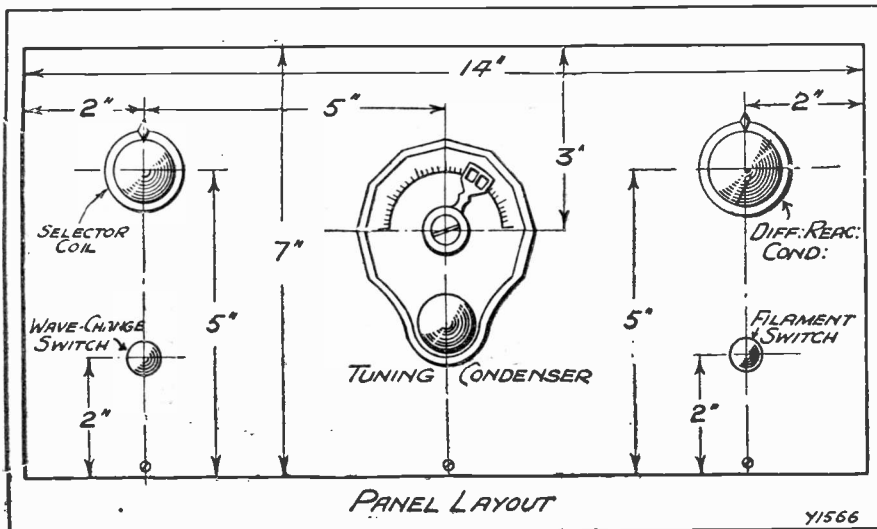
There is only one L.F. valve, but you'll be able to get a number of stations at good loud-speaker strength.

#### WHAT THIS SET INCLUDES

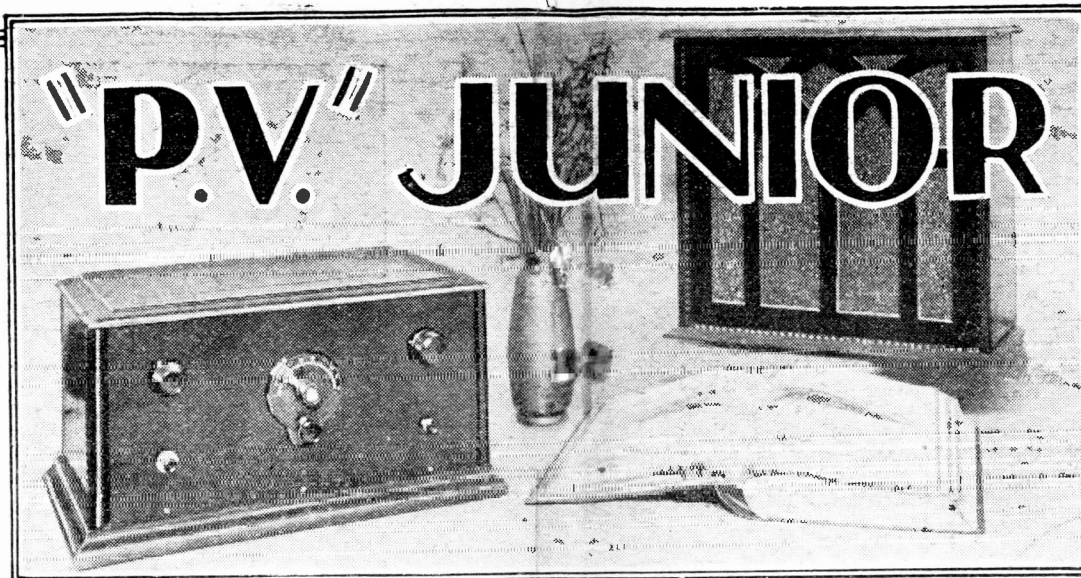
THE NEW "P.W." "P.V." COILS.  
A "P.W." "CONRADYNE" AND  
A "P.W." SELECTOR COIL.  
"P.W." DIFFERENTIAL REACTION  
A "P.W." COIL QUIT.

The very special feature of "P.V." Junior is that it employs a group of our new coils. There are the P.V.'s (P.V.1 and P.V.2), and a Coil Quoit carrying the "P.W." Contradyne winding. Additionally there is a "P.W." Selector. The result is full effectiveness over both wave-bands, and no losses due to compromises in windings and couplings, or to dead-end turns hanging close to inductances that are trying to work. On the long waves all the windings are active, while on the medium waves the inactive turns of wire are on separate

#### ITS CONTROLS ARE A JOY TO HANDLE



Sharp tuning, wonderfully smooth reaction on both wave-bands and the Selector to provide added power plus easier station separation, make the "P.V." Junior a pleasure to handle.



An extremely inexpensive Two-Valver that will give you exceptionally effective two-band results.

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

formers well removed, electrically, from the others and shorted out.

#### No Coil Interaction.

They might just as well be right out of the set for all the interference they can occasion to the windings that are being used!

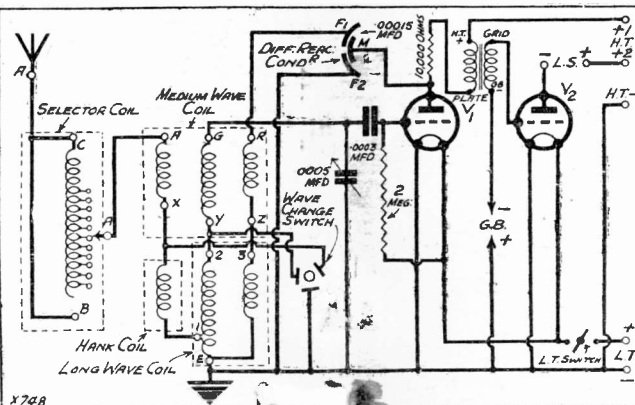
Thus the ideal of perfect two-band virility is obtained. Nothing at all is sacrificed for the inclusion of panel wave-change—the results equal the best that can be done with plug-in coils.

The parts used in the assembly of "P.V." Junior are of an entirely standard nature.

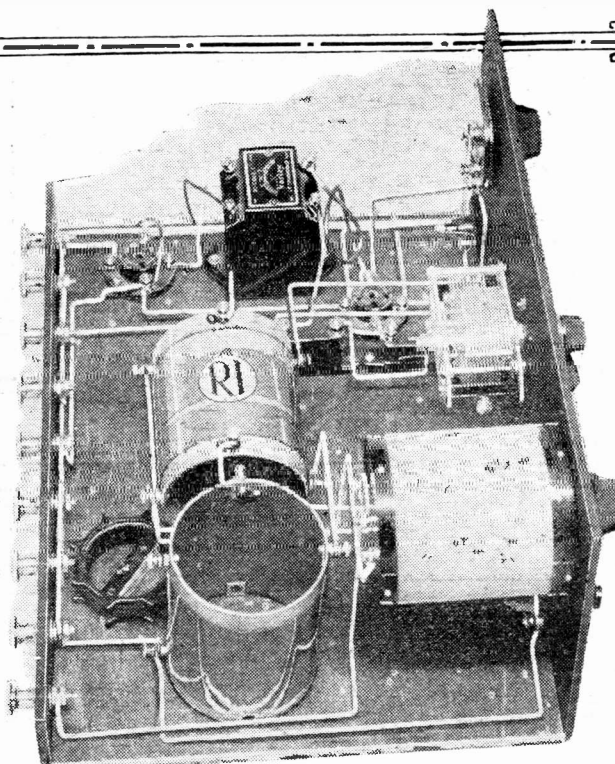
#### THESE ARE THE PARTS YOU WILL NEED

- |   |  |   |
|---|--|---|
| 1 Panel, 14 in. × 7 in. (Permcot, or Peto-Scott, Parex, Wearite, Goltone, etc.).  | 1 Radio, Wearite, Red Diamond, Ormond, Magnum, etc.).  | 1 0003-mfd. fixed condenser (T.C.C., or Ready Radio, Telsen, Ediswan, Dubilier, Ferranti, Mullard, Igranice, Watmel, Formo, Graham-Farish, etc.). |
| 1 Cabinet with baseboard, 10 in. deep to fit (Peto-Scott, or Camco, Pickett, Osborn, Compton, Lock, Kay, Gilbert, etc.).  | 1 Selector coil (Ready Radio, or Goltone, Wearite, Parex, R.I., Peto-Scott, Magnum, etc.).   | 1 2-meg. grid leak and holder (Ferranti, or Dubilier, Telsen, Graham-Farish, Ediswan, Ready Radio, Varley, Watmel, Igranice, Mullard).            |
| 1 0005-mfd. tuning condenser (Astra, or J.B., Cylidon, Polar, Lotus, Ormond, Igranice, Ready Radio, Dubilier, Formo, Burton, Wavemaster, Crossley, Telsen, etc.). | 1 Pop Vox long-wave coil (R.I., or Tunewell, Wearite, Peto-Scott, Farish, Ediswan, Ready Radio, Varley, Watmel, Igranice, Mullard).  | 1 L.F. transformer (Varley, or Telsen, Lotus, Lewcos, R.I., Ferranti, Igranice, Goltone, Atlas, Formo, Mullard, etc.).                            |
| 1 Slow-motion dial (Astra, or Igranice, Ormond, Ready Radio, Telsen, etc.).   | 1 0001-, 00012-, or 00015-mfd. differential reaction condenser (Formo, or Telsen, Ready Radio, Igranice, Polar, J.B., Dubilier, Ormond, Lissen, Magnum, Parex, Burton, Wavemaster, Cylidon, etc.). | 1 10,000-ohm spaghetti resistance (Bulgin, or Telsen, Lewcos, Varley, Ready Radio, Peto-Scott, Graham-Farish, Tunewell, Magnum, Sovereign).       |
| 1 Filament switch (Ready Radio, or W.B., Igranice, Lotus, Benjamin, Peto-Scott, Bulgin, Magnum, Red Diamond, Wearite, Junit, Telsen, Ormond, etc.).               | 1 3-pole wave-change switch (Junit, or W.B., Bulgin, Peto-Scott, Ready Radio, A.E.D., Formo, Melbourne, Goltone, Ferranti, etc.).  | 1 Coil Quoit (Wearite or Peto-Scott, A. E. D., Redfern, etc.).  |
| 1 Pop Vox. medium-wave coil (R.I., etc.).   | 2 Valve holders (Telsen, or W.B., Lotus, Igranice, Clix, Bulgin, Formo, Junit, Benjamin, Wearite, Magnum, Dario, etc.).  | 1 Terminal strip, 14 in. × 2 in.  |
|   | 2 ozs. No. 24 D.S.C. wire.   |   |
|   | 9 Terminals (Ealex, or Igranice, Belling & Lee, Clix, etc.).   |   |
|   | Wire, screws, etc.   |   |
|   | Glazite or Lacoline for wiring.  |   |
|   | Grid-bias plugs and H.T. plugs (Clix, or Igranice, Belling & Lee, Ealex, etc.).  |   |

#### UNIQUE "P.W." FEATURES



The circuit is an aggregation of the most useful features developed by the "P.W." Research Department during the past year.



The special "P.W." coil devices ensure maximum power plus sufficient selectivity for modern ether conditions.

The "P.V." coils are freely obtainable in many different makes at prices that render it hardly worth the trouble to wind them yourself.

As for the Selector, that is rather a different proposition, and most of you would find the construction of this a pretty tricky task. However, we have published full details for the benefit of those who want them, and no doubt we shall repeat them from time to time. The same applies to the "P.V.'s" except that these are easy to wind. And if you glance through a few back numbers you will quickly locate the instructions.

The "Contradyne" necessitates one Coil Quoit, and on this should be wound sixty turns of 24-gauge double-silk-covered wire.

#### A Good L.F. Stage.

Buy the best L.F. transformer your pocket-book lets you run to. for, remember, there is only one amplifying valve in this little set and you want to get as much out of this as possible.

Now for the assembly of the parts. The wiring diagram is exactly to scale, so that you can, if you so desire, work out to eighths of an inch exactly where every component goes. But such precision is quite unnecessary in "P.V." Junior. So long as you place the parts approximately as shown, you

will meet with no difficulties, for plenty of space has been allowed.

#### "Extenser" Tuning.

Here I must interpolate a few words about the "Extenser." If you include one of these fascinating components instead of an ordinary variable condenser and a wave-change switch, drop the Selector down to a midway point on the panel. This results in a quite pleasing layout.

One of the components on the baseboard, the one that is marked 10,000 ohms, looks more like a worm than a piece of wireless apparatus! It is one of those new spaghetti resistances. I mention this for the sake of those readers who may not yet have met "spags."

#### No Soldering.

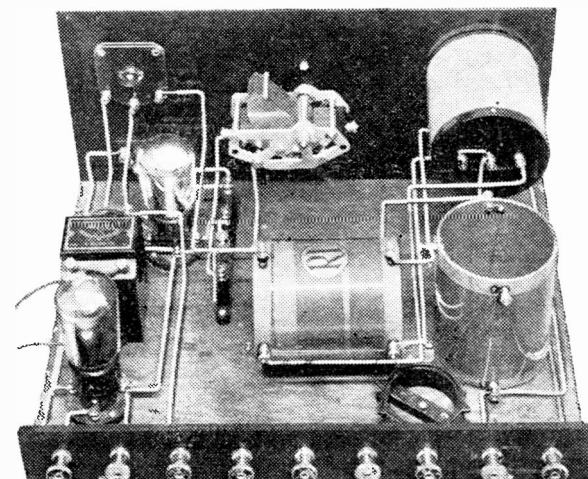
There is no need to solder the leads, providing you make the connections firmly and the ends of the wires are securely gripped by the terminals and screws on the various components.

A slight alteration from the wiring illustrated is necessitated by an Extenser. The actual device is mounted on the panel in exactly the same manner as the ordinary variable—indeed, it will probably fit in the identical panel-mounting hole.

There will be two terminals on the Extenser corresponding with "F" and "M" on a variable, and a group of terminals that replace the wave-change switch. To any two of these (there may be three or four of them) go two of the leads otherwise connected to the wave-change switch.

(Continued on next page.)

#### SURPRISING SIMPLICITY



Notwithstanding the advanced nature of the circuit employed, the assembly of the set remains true to "P.W." traditions—snag-free and within the powers of anyone.

# "P.V." JUNIOR

(Continued from previous page.)

The third wave-change switch lead is not required, and this one is described in the caption to the wiring diagram. You see, the Extenser nearly always saves at least one lead!

If your differential reaction condenser happens to have two F.1 or F.2 terminals you can wire up to either, it will merely be that the one terminal point has been duplicated for purposes of symmetry.

There is little else that requires to be said about the construction of this little receiver, for it is a perfectly straightforward job and you can hardly go wrong if you make fairly frequent references to the diagrams and photos that accompany this article.

## Concerning Valve Ratings.

There is also a list of recommended accessories to guide you in the choice of valves, batteries, etc.

In regard to the valves, you have the choice of three different L.T. voltage ratings, viz., 2, 4 and 6 volts. But I don't suppose there will be many using 4- or 6-volters.

The "two's" are so good these days that there is nothing much to be gained in a set of the nature of "P.V." Junior in going away from this economical class.

And you will need only a very small accumulator for the L.T.; one of twenty ampere/hours capacity will be quite large enough. But see that it is an "Actual" capacity rating and not "Ignition."

One hundred volts H.T. should be ample, but don't try to "make do" with less than that (99 volts is near enough).

You will probably find that 9 volts grid bias will suffice, though the actual figure needed depends entirely on the valve used in the second valve holder. I would prefer one of those 2-volt power valves of modern and efficient make—a super-power type is hardly necessary in this little set.

## A Final Point.

Some of you may want to use a Pentode and so achieve even greater amplification. But I do not advise you to do this unless you are also prepared to employ one of those

## THE ACCESSORIES REQUIRED

### LOUD SPEAKER

—W.B., Celestion, Amplion, Blue Spot, B.T.-H., Undy, Mullard, Donotone.

### VALVES.—1 H.L.

type for det. Six-Sixty, or Mazda, Osram, Fotos, Eta, 1 L.F. or power type (Mazda, etc.).

### BATTERIES.—H.T.

100-120-volt battery. Ever Ready, Oldham, Drydex, Pertrix, Grosvenor, G.E.C., National, Fuller, G.B., to suit output (Pertrix, etc.).

### ACCUMULATORS.

—2-, 4-, or 6-volt to suit valves. Fuller, Exide, Ediswan, Pertrix, Oldham.

### MAINS UNIT.

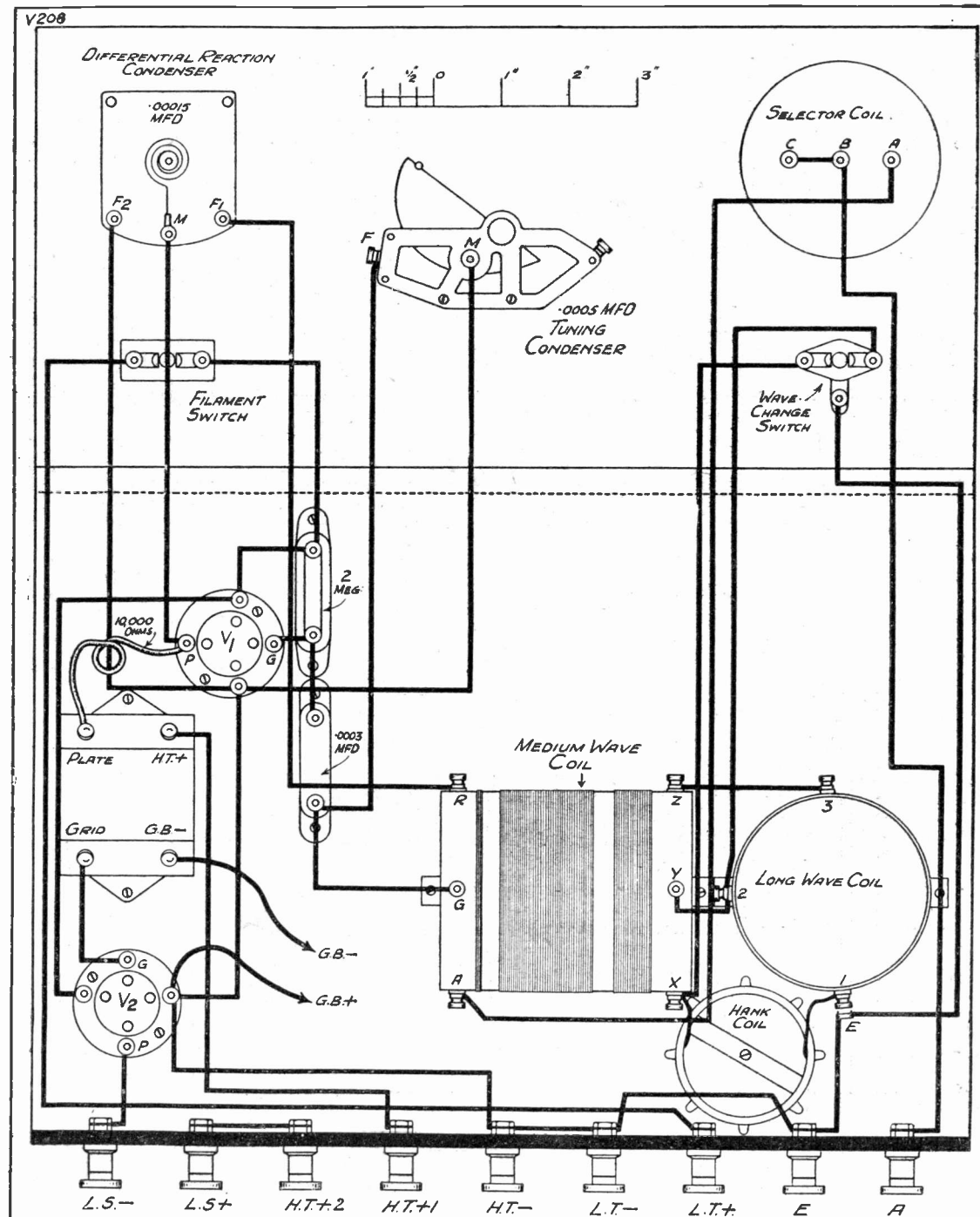
Heayberd, Ekco, Tannoy, Regentone, Atlas, R.I., Junit.

(State details of set, valves, mains voltage and type when ordering).

special Pentode output transformers. It is simple enough but rather expensive.

However, "P.V." Junior as it stands is a powerful little outfit, quite capable of giving you all the loudspeaker volume you want from a number of stations.

## THE WIRING WON'T TAKE YOU LONG!



If you use an Extenser the lead running from the wave-change switch to "E" on the long-wave coil can be omitted altogether.

# NOW

## THE NEW H.F. INTERVALVE COIL

Matched coils ensure perfect ganging . . .



FOR USE WITH THE CONSTANT SQUARE PEAK COIL

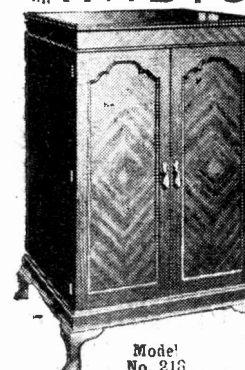
LIST No. BP6  
PRICE 8/6

# Varley

Advt. of Oliver Pell Control, Ltd., 103, Kingsway, London, W.C.2.

Completely screened, and its inductance as screened is exactly matched to that of the Varley Constant Square Peak Coil. With a good ganged condenser the tuning will keep in step over the whole long- and medium-wave range. Suitable for tuned-anode or tuned-grid circuits. Extension rods are supplied for mechanically coupling the switch to that of the Constant Square Peak Coil.

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MODEL No. 218. SPECIFIED FOR THE "WIRELESS MAGAZINE" "A.C. SUPER 60."

A Queen Anne Radio or Radio-Gramophone Cabinet, 3 ft. 10 ins. high, 2 ft. 2 ins. wide, 1 ft. 6 ins. deep. Size of baffle board behind fret, 24 ins. x 24 ins. Metallic fabric for fret front included. Opening at top and back. Cabinet takes panel 2 ft. x 9 ins., or smaller.

PRICES: Machined ready to assemble: Oak £3 10 0. Mahogany £3 15 0. Assembled ready to polish: Oak £4 10 0. Mahogany £4 15 0. Assembled and polished: Oak £5 10 0. Mahogany £6 5 0. All models Carr. Paid. Send 3d. in stamps for 56-page illustrated catalogue.

CHAS. A. OSBORN, Dept. P.W., The Regent Works, Arlington St., London, N.1. Telephone: Clerkenwell 5095. And at 21, Essex Road, Islington, N.1 (1 min. from the Agricultural Hall). Telephone: Clerkenwell 5634.

## SOVEREIGN SCORE AGAIN!

### WITH SOVEREIGN COIL QUILTS

Building "P.W." Sets? Then you'll be glad to hear you can now use Coil Quilts made by Sovereign (Regd. Design No. 763832). Made in moulded Bakelite with 4 drilled holes to start and finish winding, conveniently slotted shoulder and 2 lugs for baseboard or panel mounting. You can also use Sovereign P.J. and P.V. coils as well. All these components are made to correct specification with usual Sovereign quality.

6D. EACH

**P. J. COILS**  
Wound to exact specification of 'Popular Wireless'.  
P.J. Coil No. 1 2/-  
No. 2 1/6. P.J. Coil No. 3 2/-

**P. V. COILS**  
Wound to exact specification of 'Popular Wireless', per pr.  
Send direct if your dealer cannot supply (also for full list) to: SOVEREIGN PRODUCTS LTD., 52-54, Rosebery Av., London, E.C.1.

**SOVEREIGN**  
S.F.B.



The Sign of Quality

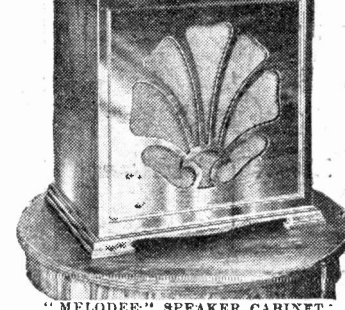
## Specified for the "P.V." JUNIOR

In order that the very best may be obtained from the special coils used in this circuit, the designer has specified an ASTRA Tuning Condenser with ASTRA Fast and Slow Motion Dial. Use them as advised by the designer and obtain perfect tuning control.

Astra Tuning Condenser '0005 - 5/3  
Astra "Popular" Dial - - - 3/-

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Get the best out of your speaker unit by housing it in the Camco "Melodee" Speaker Cabinet. The "Melodee" definitely improves speaker performance, and is a handsome and well-finished piece of furniture.

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# POPULAR KITS FOR "POPULAR" SETS —READY RADIO!

You can now buy your Ready Radio Kit from your local dealer, but be sure it is a genuine Ready Radio Kit.

## "P.V." JUNIOR

### THE "P.V." JUNIOR

	£	s.	d.
1 Polished ebonite panel, 14" x 7" x 3/16", drilled to specification	4	6	
1 Hand-polished oak cabinet with 10" base-board	1	5	0
1 ReadRad -0005-mfd. variable condenser	4	6	
1 ReadRad Duograph S.M. dial	6	6	
1 ReadRad -00015 differential reaction condenser	5	0	
1 ReadRad filament switch	1	6	
1 ReadRad 3-point wave-change switch	12	6	
1 ReadRad Star Turn selector coil	8	6	
1 Pair ReadRad Pop Vox medium and long wave coils	2	6	
1 ReadRad long wave quito coil	1	0	
2 Telsen 4-pin valve holders	1	0	
1 ReadRad -0003-mfd. fixed condenser	1	4	
1 ReadRad 2-meg. grid leak and holder	8	6	
1 Telsen "Radioguard" L.F. Transformer	1	0	
1 ReadRad 10,000-ohm Spaghetti resistance	1	3	
1 Terminal strip, 14" x 2" x 3/16", drilled to specification	2	3	
9 Belling-Lee "R" type terminals	10		
5 Belling-Lee wander plugs	2	6	
1 Packet "Jiffilux" for wiring	19	0	
2 Mullard valves to specification: Det. and Power	8		
Flex, wire, screws, etc.			
<b>TOTAL (including valves and cabinet)</b>	<b>£5</b>	<b>10</b>	<b>6</b>

#### TO OVERSEAS CUSTOMERS.

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

**KIT "A"** less valves and cabinet **£3-6-6**

or 12 equal monthly instalments of **6/-**

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or 12 equal monthly instalments of **7/9**

**KIT "C"** with valves and cabinet **£5-10-6**

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### THE "POP-PORTABLE"

Completely assembled, with valves and cabinet, ready for use and a trial tested. Royalties included. **£13-9-0**

or 12 monthly payments of **24/9**

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### "POP-PORTABLE" CABINET with Wound Frame Aerial

The Cabinet supplied with Kit "C" can be obtained separately with ready wound frame aerial **£2-15-0** Cabinet without aerial **£2-5-0**

### THE "POP-PORTABLE"

	£	s.	d.
1 ReadRad portable cabinet to specification	2	5	0
2 J.B. -0005-mfd. condensers, slow-motion log type, 40-1 ratio	1	1	0
1 ReadRad -00015-mfd. differential reaction condenser	5	0	
2 T.C.C. -01-mfd. fixed condensers	5	0	
3 Telsen fixed condensers, -001-mfd., -0003-mfd. and -0001-mfd.	1	6	
2 T.C.C. 1-mfd. fixed condensers	5	8	
1 T.C.C. 2-mfd. fixed condenser	3	10	
2 Lewros 60-ohm flexible resistances	1	6	
1 ReadRad 10,000-ohm flexible resistance	1	0	
1 ReadRad 25,000-ohm flexible resistance	1	6	
1 Lewros 100,000-ohm flexible resistance	1	4	
1 ReadRad 5-megohm grid leak and holder	1	4	
1 ReadRad 1-megohm grid leak and holder	1	4	
1 Telsen H.F. choke	2	0	
3 Telsen 4-pin valve holders	1	6	
1 W.B. horizontal type valve holder	1	3	
1 Wearite 2-way rotary switch with terminals and indicating knob	4	0	
1 Wearite 4-way rotary switch with terminals and indicating knob	5	6	
1 Telsen "Acc" L.F. Transformer	5	6	
1 Set Bulgin frame aerial spacer	1	3	
1 Screen and foil to specification	3	6	
1 Mullard portable loud-speaker unit	1	18	6
1 ReadRad wound medium wave coils as specified	5	0	
2 ReadRad wound coil quito for long waves	7	6	
4 Oz. reel 24 g D.S.C. wire for short wave frame aerial	2	2	
4 Oz. reel 30 g D.S.C. wire for long wave frame aerial	3	0	
1 Packet ReadRad "Jiffilux" for wiring	2	6	
4 Valves to specification (S.G., Det., L.F. and Power)	2	7	6
Flex, wander plugs, spades, crocodile clips, etc.	1	10	
<b>TOTAL (including valves and cabinet)</b>	<b>£11</b>	<b>9</b>	<b>0</b>

#### TO INLAND CUSTOMERS.

Your goods are despatched post free or carriage paid.

## Ready Radio

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Telephone: HOP 5555 (Private Exchange)

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## IMMEDIATE DESPATCH ORDER FORM

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**CASH ORDER.** Please despatch to me at once the goods specified for which I enclose payment in full of  
**C.O.D. ORDER.** Please despatch to me at once goods specified for which I will pay in full the sum of  
**EASY PAYMENT ORDER.** Please despatch my Easy Payment Order for the Goods specified for which I enclose first deposit of

£.....  
£.....  
£.....

Name.....  
Address.....  
Kit required.....



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



## KENNEDY CORONET CHASSIS.

I HAVE just completed a series of tests with a Kennedy Eight-Valve Coronet Chassis, lent me by W. Lusty & Sons, who are the distributors of these instruments. It is an all-electric outfit for A.C. mains, and the moving-coil speaker unit which is available with it has a mains-actuated field.

The photo that appears on this page will give you some indication of the compactness of the chassis, but can only hint at the

drum operates the third section. The two drums can be operated simultaneously, and three circuits tuned.

But that is possible with triple assemblies of an ordinary nature; where this Extenser scores is that it can automatically wave-change three tuned circuits as well!

There is no need for a complicated ganged switch system or for three separate wave-change switches as would otherwise be the case.

Moreover, the switch mechanism is in every instance situated exactly where it should be for the most economical and efficient wiring—right on each condenser concerned in the individual circuit.

These colossal advantages are so obvious that there is no need for me to dwell upon them.

But on top of this the drums carry readings applicable to all the wave-lengths, medium and long, and in a commercial set they would, of course, be directly calibrated in wave-lengths or frequencies.

As to the Cyldon Triple Extenser assembly itself, words are hardly adequate to do it justice. It is a magnificent piece

of work, and so robustly constructed that its Five Years' Guarantee seems quite unnecessary. Nevertheless, it must not be thought that it is ugly in its solidity. It decidedly is not, but has an excellent finish, and it is a pleasure merely to look at it.

The movement is smooth, and the "self-changing" imposes negligible resistance and is completely effective.

Sydney Bird & Sons, Ltd., are certainly setting the pace in the application of the Extenser principle just as they did in the construction of ordinary variables in earlier days.

Those Continental and American firms that have signalled their intention to develop Extensers for use in their own countries will certainly have to do wonders to equal, let alone beat, our pioneer Britishers in this latest radio development.

By the way, if you go to Olympia this year, make a special point of examining some of the several Extensers that will be on show on various stands. Should you

not have handled one of these devices before, I am sure you will be fascinated by its action and immediately apparent points of interest.

The Extenser wants to be seen, if possible on a set, and demonstrated before its full

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

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

advantages can be fully appreciated. Many constructors have doubted its usefulness before actually coming into contact with it—they do not do so afterwards!

## "LEWCOS" MAKING OUR COILS.

I have some good news for constructors; the London Electric Wire and Smiths Co., Ltd., a concern known more familiarly as Lewcos, are making "Popular Wireless" P.V. and P.J. coils.

This is, of course, a signal compliment for these "P.W." designs, as Lewcos are the premier wire and coil makers of this country.

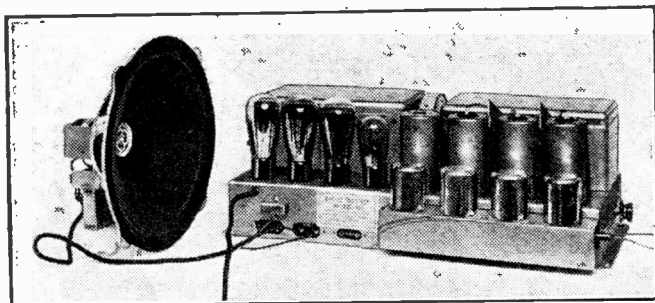
Their Glazite wire must figure in more radio receivers than any other single proprietary production. But I believe even the large quantity used in this way is overshadowed by the thousands of miles of the material employed in telephone installations!

I have examined a complete set of Lewcos P.V. and P.J. coils, and I can assure you that they are really first-class components from every point of view.

They are definitely superior to many other makes, and this, in the circumstances, is hardly surprising!

I particularly like the little mounting feet that are securely fixed to them, for these enable the coils to be mounted either vertically or horizontally.

Constructors should make a particular note of these "Lewcos" P.V.'s and P.J.'s.



This is the Kennedy Coronet 8-valve Chassis.

skilful engineering that has been put into the design and construction.

The receiver lacks only a cabinet, and it can be built into any type to suit the individual user.

Both short and long waves are covered, and the power, selectivity and quality of the set are of the most commendable class.

There are many points of interest in the outfit which I would like to mention, but I fear space will not permit. I would advise interested readers to write to Messrs. Lusty, at 79/81, Paul Street, London, E.C.2, for descriptive literature.

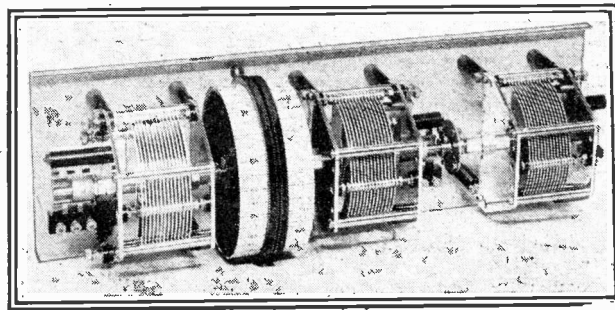
## EXTENDING THE EXTENSER.

Sydney Bird & Sons, Ltd., are, I believe, going to produce quite a number of different gang, dual and triple Extensers during the coming season. Apparently they foresee great demands for Extenser applications of this nature.

Personally, I should be greatly surprised if there were not, for with every additional Extenser incorporated in any one set the advantages of the principle leap up by bounds.

For example, take the Cyldon Triple Extenser assembly, a sample of which I recently received for use in a special set.

Two of the sections are ganged, and are controlled by the one drum drive, a second



The Cyldon Triple Extenser Assembly referred to on this page.

RECENTLY I described how the change over from summer to autumn and winter reception conditions generally occurs. I said, if you remember, that most frequently it proceeded by means of a series of jumps forward, and that interspersed with these were not infrequently short periods in which a setback was quite noticeable.

One of these setbacks occurred towards the end of July, when nearly all stations were distinctly weaker than they had been just previously. This was followed by a marked improvement both in strength and in the number of stations receivable.

#### Peaceful Spain!

It was rather unfortunate that just when the Spanish stations once more gave signs of coming in well broadcasting in Spain should have been interfered with to some extent by political troubles. Both Madrid Union Radio, though, and Barcelona are now returning rapidly to form, and I can recommend them to your notice.

On the long waves Huizen shows signs of becoming one of the best, if indeed not the very best transmission. The volume obtainable from this station with quite a small set is remarkable at present. With a four-valve portable, for instance, loud-speaker reception is obtainable just now at any time when the station is in operation.



Some practical distant programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

Russian transmissions on unauthorized wave-lengths still interfere at times with Radio-Paris, Zeesen and Oslo, but when they are free from interference all of these stations are good. If you haven't heard Motala for some time try for him now, for he is in good form. Kalundborg, too, is better than he has been for some while.

Before very long we shall have Budapest coming in as well as ever and that is saying a good deal. At present both he and Vienna have their evenings and you should never neglect to turn to the settings required for them when you are making a trip abroad with the wireless set.

#### Milan "On the Mend"

Milan has been showing unaccountable weakness for some time, but there are signs now that he is coming back. Langenberg is a station nearly always worth attention. Rome is particularly good just now, and neither Beromunster nor Sottens should be overlooked.

Stockholm varies a good deal, but when conditions are reasonably good you should

Frankfurt, Hamburg, Breslau, Heilsberg, Leipzig and Nurnberg vary a good deal, and the volume obtainable from them is often surprising.

#### Some Good "Goers"

Turin is coming in well at present, being now free from heterodyne troubles. Hilversum is often first-rate. I have had good reception from Goteborg, from both the Brussels stations, and from Strasbourg.

In the next week or two numbers of the smaller stations will make their voices heard again, and you should be on the look out for them. Here are a few that you should try for after dark.

Munich (533 m.), Bergen (493.4 m.), Prague (487 m.), Lyons La Doua (466 m.), Belgrade (430.4 m.), Brno (342 m.), Naples (332 m.), Copenhagen (281 m.), Bratislava (279 m.), Lille P T T (265.4 m.), Moravska-Ostrava (263 m.), Horby (257 m.) and Gleiwitz (253 m.).

If you have a good receiver no doubt you will also hear a lot of the relay stations.

THIS business of identifying short-wave stations is becoming more and more difficult. The "landmarks" become familiar to everyone, after they have listened for a few weeks, but all these stations that spring up in the night are another matter. Especially when they turn out records for hours on end with no announcements!

The tantalising part of it is that one doesn't want to shut down or tune off them without knowing who they are, because one cannot tell from their strength whether they are in Germany or the Fiji Islands. It is most annoying to think that one might have been logging a brand-new station without knowing it.

#### Identification Troubles

Even some of the "published" stations with their own allotted wave-lengths are bad enough. I am thinking of those who come five or six degrees apart on the dial. It is impossible to tell, without a very accurate wavemeter, whether the one you are listening to is on 31.66 metres or 31.97 metres!

This time I am really getting down to the matter, and I am building an entirely separate wavemeter of the simplest possible type that can be expected to keep accurate. I hope the Editor will allow me to exhibit it to the world at large when it is finished.

Has anyone yet heard WSEA, the Wilkins expedition? Naturally, with all the bad luck they have been having with the "Nautilus," they probably have not had much time on the air, but as they really appear to be starting now, we might possibly hear from them.

Incidentally, what a chance of a thrill there will be if they reach the North Pole

## SHORT-WAVE NOTES

A few interesting observations concerning happenings down on the short waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

and can still put out readable signals. I have heard Byrd's signals from the South Pole, and mean to hear the "Graf Zeppelin" from the North Pole, but a submarine is a different matter altogether. I have logged signals from a submarine once, in fact I have had a two-way chat with him, but that was in 1925. The submarine in question was near St. Nazaire, using the call-sign X E F 8 J T. Does anyone else remember this?

Can anyone identify a station in the region of 32 metres that occasionally broadcasts dance music and announces in English? J. S., of Notts, is puzzled by this, and I seem to have seen other queries on the same subject.

## HELP THE NEWSAGENT.

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but will make sure of getting your copy regularly each week.

At midnight they apparently broadcast chimes followed by twelve strokes, and then more chimes. If this description is sufficient, and any reader happens to be able to throw light on the subject, will they please set J. S.'s mind at rest?

#### A Good "Yankee" Set

A. W. R., of Watford, confesses to being rather struck by the layout of the well-known American shortwaver called the "Super-Wasp." Yes, A. W. R., it certainly is thoroughly good, and you need not let the six-volt valves worry you in the slightest.

If you make a layout on those lines and use British two-volt valves I don't think you can possibly go wrong. Apologies for the delay, by the way, A. W. R., but the holiday period came in between!

J. H. W., alias G 2 T K, of Hull, kindly offers to become my Northern Correspondent! I am always glad to receive letters of any length, J. H. W., describing short-wave conditions and experiences, and should be very glad if you would join the ranks. Perhaps we shall meet "on the air" again some time.

#### "Supers" or "Straights"?

Again, I am going into the question of short-wave super-hets. versus "heavy stuff" of other kinds, and before I write next week's notes I hope to have had an evening out with a good receiver in each class.

Then I will have something to say to all those who are planning to make a super-receiver for the coming winter session. My preference at the moment lies in the direction of the super-het., but I somehow feel that I am about to be converted!

# THE MIRROR OF THE B.B.C.

## BOTHER AND NERVOUSNESS

### TWO MONTHS' LISTENING: GENERAL IMPRESSIONS—THE COMING "PROMS."

I HAVE been encountering a good deal of irritation and "nerves" in connection with my normal collection of news and views at Savoy Hill the last few days. I was disposed at first to put this down to the seasonal slump in wireless nerves such as I had encountered rather more definitely in the early days of the B.B.C. But there was something in it more than this, and it did not take me long to get at it.

The trouble is about Broadcasting House. Nobody who knows queries the studio accommodation, but the snag is about the offices. There are not nearly enough, and a good many of those available are not really tolerable.

There is a great deal of unrest in the B.B.C. staff about the whole business, and it would be well for all concerned if Sir John Reith would look into the problem and clear it up in his characteristically thorough and painstaking way.

#### Two Months' Listening : General Impressions.

I have now been listening every night for two months and have been comparing my notes with those I made over a similar period in 1925. There is no comparison.

British broadcasting is an entirely different thing now. Six years ago it was amateurish, sketchy and irregular. To-day it is on a vastly higher level both of entertainment and intellectual values; there are signs of better organisation and a surer touch generally.

But I do miss the intimate note of the old days; I would indeed sacrifice a little efficiency to find it restored. How refreshing an occasional mistake can be when gracefully turned! I got quite a kick when I heard an announcer pronounce Chisholm as it is spelt; but for the life of me that was the only error I could detect in eight weeks' listening.

And there is another point while on this: there is a great growth of the impersonal: just the other extreme from Arthur Burrows' famous "close-down" lines about filling the night with music. Let's get back a little sentiment and soften something of the present impersonality.

#### Dance Music Trouble.

Moves behind the scenes in the dance music trouble are continuing and are due to come to a head in the autumn. No solution has as yet been devised for abolishing the plugging evil, and it seems likely to remain in one form or another unless and until the B.B.C. assumes responsibility for all transmissions of dance music.

I am moved to say I think altogether too much fuss is made about plugging. What matters is the quality and variety of the programmes that get into listeners' homes. There can be no denying that listeners really want as many of the best outside dance bands as possible, and in their best pieces.

If publishers go out of their way to subsidise bands for playing the best music, that is their business. But it must not be overlooked that no bad dance music is ever plugged; it just wouldn't pay, and the fact of the subsidies is in a sense a guarantee of high standard even if it involves repetition.

So let's cut the cackle and have the music we want.

#### The Coming "Proms."

Listeners are fairly well acquainted with this year's series of Promenade Concerts at the Queen Hall, the broad details of which I have given in previous notes. For those who keep a diary of forthcoming radio events it will be worth noting that September and October relays from the "Proms" will be included in the National

Programme on the 2nd, 4th, 7th, 9th, 10th, 15th, 17th, 19th, 21st, 22nd, 24th, 25th, and 29th of September and on the 1st and 3rd (last night) of October.

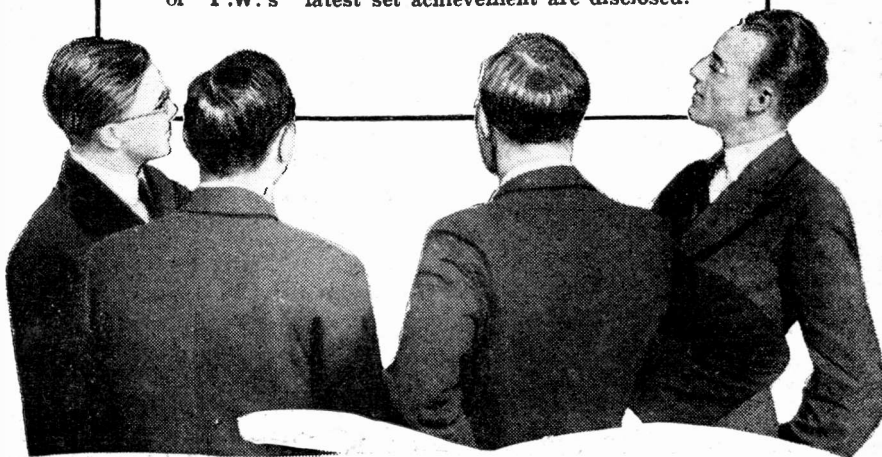
Relays for London listeners have been fixed for September 1st, 3rd, 5th, 8th, 11th, 12th, 14th, 16th, 18th, 23rd, 26th, 28th, and 30th, and October 2nd. All concerts, of course, will begin at 8 p.m.

Phyllis Robbins, a clever syncopated singer, and Johnson Clark, the ventriloquist, who took part in this year's Command Performance at the Palladium on May 11th, are newcomers to the London Regional Vaudeville Programme on Saturday, August 15th, when they will be in the studio with such experienced performers before the microphone as Gillie Potter and Vivienne Chatterton.

#### IN OUR NEXT ISSUE!

## THE "SUPER-QUAD" CIRCUIT

A special article in which the technical features of "P.W.'s" latest set achievement are disclosed.



## FOR THE LISTENER

By "PHILEMON."

Our popular contributor is now abroad, and this week he throws an interesting side-light on radio in Holland.

AS I warned you last week, I am writing this from Holland. We could not cross the Dutch frontier this evening as we arrived too late. There were several reasons for that.

One was Leyden, where we rather overdid our desire to render homage to the works and the memories of the great Dutch painter, Rembrandt. No motorist with a soul could "hog" through Leyden.

Nor, soul or no soul, can he very well hog through Holland, anyhow. You can't hog over "pavé." Pavé is a roadway laid with anything from cobbles to stone and brick sets.

They must wear well; and on the whole I prefer pavé to potholes. In Holland the pavé isn't really bad; but it has the effect of lowering your m.p.h. So we miscalculated our time, and were late at the frontier. The "gates were shut."

There was nothing for it but to stop. A

policeman with his hand up is a stony-hearted fellow, but a Customs officer on a frontier is granite all through. You explain in vain. You beseech in vain. The prettiest woman in your party smiles in vain. Neither blandishments nor palm oil is any good.

Frontiers as a rule are not very interesting places. To me they seem lonelier and more desolate than anywhere else. I feel I might easily be bludgeoned and robbed there.

#### Stranded on the Frontier.

Everybody is foreign. Everybody is hostile. You are like a rat in a trap, and the dogs are watching you from the outside. This particular frontier was not bad; it was pleasant cultivated country, with pine-woods, not unlike some parts of Surrey. So we ran the car under a shed, and prepared to stay the night.

(Continued on page 698.)



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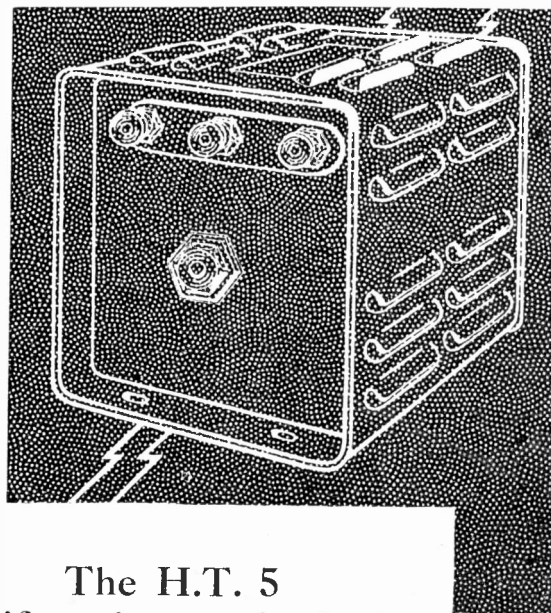
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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of 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

### IMPROVING THE "CONTRADYNE" TWO.

E. N. S. (St. Albans).—"My 'Contradyne' Two proved to be a winner, the only fault that ever troubled me with it being a crackle due to bad contact at switch. I am thinking of renovating the set for next season.

"Could I do away with the wave-change switch and use an Extenser instead?

"Also would an output filter for the loud-speaker, using a 20-henry choke and 2-mfd. condenser, be O.K. (usual connections)? And is wave-change-switch wiring to go to Extenser 'switch,' if this can be used?"

Both the improvements are well worth while. It is not quite clear from your question whether you wish to use the usual output connections that are already known to you, or to ask what are the usual output connections, so we give the connections (in words) below:

The 20-henry choke must be wired between H.T. + 2 and V2 plate (in place of the L.S. terminals). From the plate an extra-lead goes to one side of the 2-mfd. condenser. The other side of this goes to a new loud-speaker terminal.

The second, new loud-speaker terminal goes to L.T. —, earth, of any convenient part of the wiring which connects direct to these two points.

The fitting of an Extenser is simplicity itself. Simply take out the old variable condenser and wave-change switch, and mount the Extenser.

"Fixed" and "moving" vanes are connected as before, and the three connections which previously went to wave-change switch now go to the respective contacts on the Extenser's self-changer.

### THE CAPACITY OF THE REACTION CONDENSER.

"BILLYO" (Aberavon).—"Why is it that so many different capacities can be used for reaction?

"I have twice had trouble over this, once getting bad reaction at the top of dial because I used a '00015 instead of a '0002, and another time I had fierce reaction I could not stop.

"With tuning you always use a '0005. Why not always have the same reaction capacity—say '00015—and stick to it, so that reaction condensers would be interchangeable?"

The reason that quite different capacities are necessarily employed for reaction is that the methods of obtaining it are many and various.

Tuning capacities, on the other hand, can be more or less standardised at '0005, because the tuning coils across which the tuning condensers are placed are of standard values. So except for short-wave work the '0005 tuning condenser is nearly always capable of giving the required range of capacity.

Reaction connections cannot be standardised to the same degree. The size of the reaction coupling, the type of detector-to-next-valve coupling and the class of detector valve employed all affect the question of correct reaction condenser capacity.

By using a standardised coupling coil such as the "P.V." it is possible to ensure that the reaction capacities required for "P.W." sets fall within certain reasonable limits; but until radio design settles down to only one type of reaction (as it has settled down to parallel tuning circuits) there will always be a certain flexibility of reaction-capacity requirements.

### SIDE-BY-SIDE ELIMINATORS.

"NORGE" (Gt. Yarmouth).—"Perhaps you would inform me if two H.T. eliminators can be wired side by side across a set, like two H.T. batteries?"

"In case I have not made it clear I put it so: Negative of H.T.B.1 and negative of

H.T.B.2 go to H.T. — terminal on set. One battery to H.T. + 1 terminal and H.T. + 2 terminal. Other battery to H.T. + 3 terminal.

"Very well? I have seen many batteries used this way. But not the eliminators.

"I have the one eliminator, O.K. for small set. Can I put it to work *part only* big set, like H.T. + 1, + 2, then get (for H.T. + 3) battery or another eliminator?"

Yes, you can use two "H.T. eliminators" in the way you suggest, one supplying some of the H.T. terminals, and the other one supplying the other H.T. terminals. Or you can use one "eliminator" and one battery, the "negatives" being connected together and to H.T. negative on the set.

### POOR QUALITY AND THE MILLIAMMETER.

P. C. K. (Evesham).—"Lately the speech is not so clear and music is 'ringy,' and I notice the milliammeter needle does not go right to 0 when the set is switched off, as it did, but stays at about  $\frac{1}{2}$ . Would this be anything to do with the worse quality?"

Yes. It looks as though you have a faulty fixed condenser, or some insulation failure, and this might easily upset quality and give the effects you describe.

An expert would soon find the faulty component by the aid of the milliammeter reading, and probably when the dud part has been replaced the set's quality will be restored.

Failing this you would have to send the set away to be put right, or if this is impracticable let us have full circuit details, when we can instruct you how to trace the faulty component.

## "WHY IS IT SO NOISY TO-DAY?"

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

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

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

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

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

### BRIEF REPLIES.

"PUZZLED" (Camberwell).—"One of your components is faulty or unsuitable—you should be getting dozens of stations with an aerial like that. Try substituting the components one at a time with borrowed ones till you find which is faulty. We suspect the reaction circuit, unless the set oscillates nicely now.

"Bonzo" (S.W.7).—"Certainly. We'll back you up.

R. C. (Stapleford).—"Pop Vox," every time.

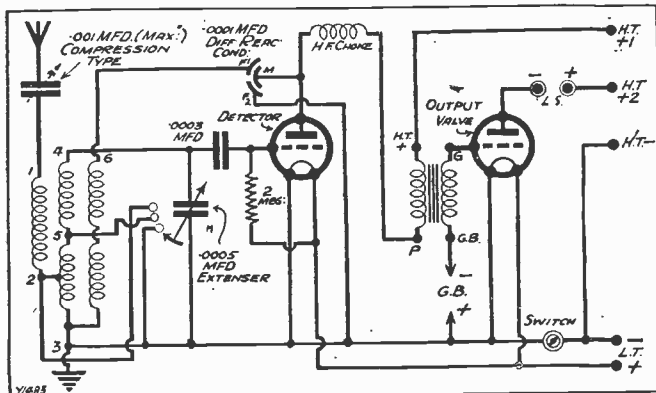
"HARROW."—"Join a piece of wire across each condenser you marked in turn; but for mercy's sake don't do them simultaneously, or you'll blow everything!

"AJAX" (Ilford).—"Quite suitable with a .5 meg.

J. A. C. (Birmingham).—"Stand the base down in position, with the four sockets in line towards you. There is then one socket to right and one to left. Arrange the base so (Continued on next page.)

## MISSING LINKS, No. 13.

### A Useful Two-Valver.



Here is the full theoretical diagram of the circuit given last week. It will be seen that an aerial and H.F. choke were necessary to complete it.

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

that these two are opposite the third socket counting away from yourself along the centre line.

Now number as follows: 4, 5, 2 and 1, 4 being the nearest and 1 the farthest away of the middle line.

The outer socket on the left should be marked 6, and that on the right is 3.

(Check them several times before inserting coil.)

A. C. (Bristol).—"The A.C. Paratune" was fully described in the Feb., 1931, "Wireless Constructor."

"FEDUP."—"We shouldn't contemplate legal action until every other means has failed. Surely there is a mutual friend—or acquaintance—whom you could approach? Get him to take a conciliatory message, and arrange for a talk together. And begin by admitting you lost your temper!"

"Miss M." (Hertford).—"You need two charts, one showing long waves and the other the medium. The same dial numbers 0-100 will appear on both."

The only other way is to use an "Extenser," which gives all medium-wave stations as 2-figure readings, and all long-wavers as 3-figured. But there would be a slight alteration to wiring necessary, because the wave-change switch is unnecessary with the "Extenser."

### THE "P.W." "SELECTOR" COIL.

W. A. (Darwen).—"To bring the price down to the level of my pocket I must make the 'Selector' coil myself. And I haven't made coils before."

"Is it possible to make a satisfactory component first time? And if so, how do I go about it?"

Anyone who is a bit of a handyman could make a perfect job of it at the first attempt. And even the "ham-handed" generally succeed without any

### WHEN WRITING TO US

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difficultly, provided they take the trouble to read the directions carefully. But it takes just a little care and patience, of course, which are more than repaid by results.

All that is needed is a single-layer winding of the correct size, etc., wound on a piece of good insulating tube such as "Pirtoil." There are 84 turns in all, and you have a rotating switch at one end of the tube, with studs connected to every fourth turn, so that the circuit can be tuned by rotating the switch.

The tube must have a diameter of 3 in., length 3½ or 4 in. In each end of this a wooden crosspiece is fitted, one to provide a means of mounting to the panel (two screws) and the other to form the attachment for a disc of ebonite of about 2½ in. diameter, on which the studs and arm of the "Selector" switch are mounted.

The switch has 18 studs, and the arm is fixed on the end of a brass spindle running right up the centre of the coil and out through a hole in the panel. Holes for this spindle are required in the wooden crosspieces, of course, and a knob is placed on the end to enable the switch to be rotated. Some simple kind of pointer is desirable on the knob, to indicate roughly where the switch arm is at any given moment.

The tube carries three small terminals, marked A, B, and C, and a convenient position for these is at the end furthest from the panel. The actual positions do not matter much, but it is best to see that they read A, B, C from right to left as you look at the coil from the back of the set in which it is mounted.

The winding comprises 84 turns of No. 24-gauge wire (either double-cotton- or double-silk-covered will serve) in a single layer. Begin at the end of the tube nearest the panel and wind on 20 turns.

From this point take a tapping to No. 1 stud on the switch. This is the stud on which the arm rests, when the knob is turned fully to the left.

Now put on 4 turns, tap out to No. 2 stud, 4 more turns, tap to No. 3, and so on, until 84 turns are on. Take the finishing end to No. 17 stud, leaving No. 18 blank for another purpose.

Now the internal connections of the unit. Terminal A is to be wired to the arm of the switch, and C to the start of the winding. The 18th stud, blank until now, is to be wired to terminal B.

And here are two final hints. The appearance of the unit would be improved by a covering of Empire cloth over the winding. It is easily stuck in place with a few little dabs of molten Chatterton's compound.

With No. 24 double-silk-covered wire, wound reasonably carefully, the 84 turns should cover approximately two inches of the tube.

### A FIRST-CLASS SHORT-WAVER.

E. J. N. (Gidea Park).—"I have been getting together the parts for a real first-class short-waver, for use in the autumn and winter. And the circuit will be the one W. L. S. gave in "P.W." June 6th."

"Not being much experienced at reading theory diagrams, can you give me the wiring in words. Also where an on-off H.T. switch should be wired?"

### "P.W." PANEL NO. 31.—FLEXIBLE RESISTANCES.

Generally known as "Spaghetti's" these useful components have deservedly attained great popularity during the past year.

They simplify wiring, and are highly efficient in use, with the further advantage of low cost.

Although insulated, they should not touch adjacent metal, but should run clear of other wiring, etc.

When choosing a spaghetti resistance for mains work, remember to ascertain if it can safely carry the requisite current.

The on-off switch for H.T. is best incorporated in the set itself, so we will give the wiring with this included.

Aerial terminal to fixed vanes of .0001-mfd. condenser. Moving vanes to G. of S.G. valve holder (V1), to one side of aerial coil holder, and to fixed vanes of S.G. tuning condenser (.0001).

The moving vanes of this condenser and other side of aerial coil holder are joined together, and to earth terminal, to one filament terminal on each valve holder, to the 2-mfd. fixed condenser near the S.G. valve, to the 60,000-ohm resistance, to one side of the 12 coil holder, to the moving vanes of the second .0001- and the .00002-mfd tuning condensers, to the

moving vanes of the .0001 reaction control, to the 4-mfd. condenser, to G.B. + and to one side of the filament on-off switch.

H.T. neg., L.T. neg. and one 'phone terminal are joined to the other side of this on-off switch. The three remaining "filament" terminals of the valve holders are joined together and to the grid leak and L.T. +.

The "screen" terminal of V1 goes to the remaining side of its 2-mfd. condenser, to the vacant end of the 60,000-ohm resistance, and to one end of the 50,000-ohm resistance.

The anode connection from V1 (on bulb) goes to the 100,000-ohm resistance and to one side of the .00005-mfd. coupling condenser (N.C.). The other side of the 100,000-ohm resistance goes to the H.T. on-off switch, to the 20,000-ohm resistance, to the output choke and variable resistance, and to H.T. +.

The vacant terminal on the 50,000-ohm resistance is joined to the other side of the H.T. on-off switch. The remaining terminal on the .00005 N.C. goes to the vacant side of the 12 coil holder, to the fixed vanes of its .0001 and .00002 tuning condensers, and to the .0001 grid condenser.

The other side of the grid condenser goes to G. of the detector valve holder, and to the remaining side of the grid leak.

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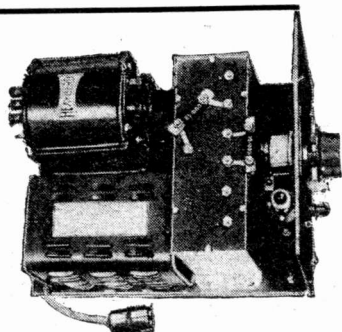


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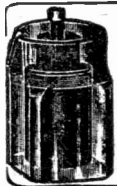
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## FOR THE LISTENER

(Continued from page 694.)

We then found that the only other people in the inn were the Customs Officers themselves. It was amusing to find what a difference it made when they took their official hats off!

One was surprisingly red-headed. Another was sleek and half-bald. They suddenly looked human, like a policeman who has doffed his helmet, or a general who has laid aside his brass hat and unbuckled his belt. They also looked smaller.

When we had first encountered them in their official kit they had loomed rather large in our anxious eyes; but now they were just "little Dutchmen." Pleasant little Dutchmen, too.

The fixed and penetrating stare had gone out of their eyes. The severe lines of the mouth had relaxed. They smiled upon us. They accepted English tobacco. They unbent, as a prison-warder will unbend to a burglar or a murderer.

### Old Dutch Customs!

We had no Dutch; but they had a little English, and we a little German; so we talked of glasshouses and tulips, of windmills and dykes, and of the ex-Kaiser at Doorn, which we had passed on the way. Then—for I spend even my holidays in serving you, you rascals! (as Gillie Potter might say)—I asked if they had the wireless.

They had, though they didn't seem to jump at the idea. It was, to tell the truth, rather a poor set, and had evidently been trained only to bark for Hilversum.

Somebody was talking from Hilversum. It might have been double Dutch for all I knew. It sounded like somebody preaching, and it probably was, for the Salvation Army had command of the transmitter that night. The speaker was very excited about it, anyhow.

Suddenly one of the Customs Officers, the little red-haired one with a freckled face and a bristling moustache, got redder and more freckled and more bristling, and said: "Oh, these confounded talks!" It sounded worse than that in Dutch, but not worse than the man looked! So, as we didn't understand, and they were obviously not caring about it, we switched off.

During the interval I learned that wireless in Holland comes in for much the same sort of criticism as at home. The little red-haired man got quite hot about it, but with good humour.

### "Give Us a Laugh!"

"After spending the day rummaging in the luggage of suspicious-looking travellers," he said with his blue eyes twinkling towards us, "we want to be amused. Who wants talks? Who wants music? Give us a laugh!" And while he enlarged on this his colleagues solemnly pulled at their pipes and nodded their heads.

It was very entertaining to watch these foreign listeners; they leaned towards the loud speaker so as not to miss a word, then rolled about in their seats and slapped their knees, and laughter put a network of wrinkles all over their chubby bright-coloured rather solemn faces. Having had their laugh, they got up and went out.

The next morning they looked once more fierce and hostile, and as hard as nails. The little red-haired man challenged us, "Have you anything to declare?" in his mother tongue. "Gar nichts," I replied casually in the tongue of a cousin several times removed.

He took me at my word like a gentleman, smiled, and with a wave of the hand passed us over the barrier into Germany.

## TECHNICAL NOTES

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

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

I HAVE more than once been asked what is the difference between a potentiometer and a variable resistance, as this point seems to be puzzling, especially to beginners. In actual fact there is no difference at all between the two except that they are used in somewhat different ways. Ordinarily one understands by the term "variable resistance" a comparatively low resistance such as that employed for regulating the filament current of the valve, the variation being brought about by shifting a slider or contact arm so that different amounts of the resistance are retained in the circuit.

In the case of a potentiometer one usually understands a relatively high resistance, some hundreds of ohms, so high that the current flowing through it with a few volts applied to its ends is relatively small. In this case we may regard the whole of the applied voltage as being uniformly broken down between the two ends of the potentiometer.

### Varies the Voltage.

Sometimes this is expressed by saying that there is a voltage drop or potential gradient from one end of the potentiometer to the other. If, then, we apply a third contact to some intermediate point of the potentiometer, and if the current drawn away from this point is very small compared to the current flowing into the potentiometer, the electrical conditions will be scarcely affected by this third point.

For all practical purposes we can assume that we are merely "tapping-off a voltage." This voltage will depend upon the position of the slider, and can be varied between the limits represented by the pressure applied to the potentiometer terminals.

But remember that there is no essential difference between the two. The difference is only one of degree and not one of kind.

When a choke-feed is used to isolate the D.C. current from an L.F. transformer winding, bear in mind that the characteristics of the L.F. choke may have a considerable effect upon the quality of the reproduction, and consequently only a good quality choke should be employed for the purpose. Some chokes have poor characteristics, especially in the upper register.

It is often a good plan to use an arrangement of this kind, or a resistance and

(Continued on next page.)

## TECHNICAL NOTES

(Continued from previous page.)

condenser arrangement, with transformers having special alloys for the core, owing to the fact that under the influence of direct current the danger of a change in the permeability is often greater with special alloys than with the ordinary type of core.

In the event of the characteristics of the transformer being seriously affected by unwanted D.C. current, there is likely to be a falling off in the amplification of the lower register.

There are various ways of improving the selectivity of a receiver, and one method, which is often very effective but which is not so commonly used as it might be, consists in employing a separate and additional tuned circuit between the aerial and the receiver, and coupling this to the receiver by means of a very small-capacity condenser.

## Variable Coupling.

The extra tuned circuit consists in the ordinary way of a coil and variable condenser, the latter being of, say .0005 microfarad and the coil being of the size appropriate for the particular wave-band which you desire to cover.

I do not think I need say any more about the extra circuit itself, as it is quite straightforward. One point of this circuit may be connected to earth and also to the earth terminal of the receiver. The more interesting point is the coupling condenser between this circuit and the aerial terminal of the set.

This coupling condenser should preferably be of quite small capacity, and you will find in general that as the capacity of the coupling is reduced the tuning will become sharper.

It is important that there should be no magnetic coupling between the coil in this extra circuit and the coil in the receiver. For this purpose the outside coil should be placed at right angles to that in the receiver and as far away as convenient.

In order to test whether there is any magnetic coupling between the two coils you might try disconnecting the coupling condenser altogether, and noticing whether anything is picked up between the coils. For the coupling condenser you will probably find it convenient to use one of the neutralising type.

## A Simple Differential Arrangement.

One of the peculiarities of a set employing reaction is that generally any adjustment of the reaction condenser—where this is the method of reaction control—involves a corresponding adjustment of the tuning and consequently it is, as a rule, necessary to juggle about with these two adjustments simultaneously.

A very simple arrangement may be made by which this trouble may be minimised, if not obviated altogether. The arrangement in fact, amounts really to a sort of rudimentary differential condenser. It consists

in taking a piece of bus-bar, or, in fact, ordinary stout wire will do, and bending this into a semi-circular form, this being then mounted so that it arches over the reaction condenser.

It should be placed so that the axis of the curve of the wire coincides roughly with the axis of the condenser, and should, of course, be in such a position that it clears the moving vanes when these are rotated to the minimum capacity position.

## Increasing Tuning Capacity.

A connection is made from the moving set of vanes of the reaction condenser to one terminal of the tuning condenser, whilst another connection goes from this curved wire to the other terminal of the tuning condenser. The capacity between the curved wire and the moving set of vanes in the reaction condenser is then obviously shunted across the capacity of the tuning condenser, and so goes to increase the capacity of the latter.

You will see that as the moving set of vanes are rotated out of engagement with the fixed vanes they come more and more into proximity with the curved wire and so the capacity of the tuning condenser is increased.

The exact position and size of this wire must be found by experiment, and if the capacity is insufficient with a wire it may be found necessary to use a curved piece of brass strip.

The above-mentioned dodge is sent on to me by a reader, although as a matter of fact it is by no means new. It is not applicable in all cases, but in cases where it is applicable it sometimes forms a simple and convenient method of getting over the difficulty referred to.

## Improving a Dial.

If you have a set fitted with an ordinary graduated dial, and the movements of this dial are too coarse, you can either substitute a vernier dial, or, if you do not wish to go to the expense of that, you can adopt a very simple arrangement which, in effect, converts the existing dial into one of a vernier pattern.

All you have to do is to drill a hole in the panel at a suitable position, just clear of the edge of the dial and preferably at its uppermost or lowermost point, and insert a threaded shaft which is ultimately secured in position by means of a small nut before and behind the panel. Upon this shaft is mounted an ebonite rod drilled so that it turns easily upon the shaft, and having a stout rubber band around it at the part adjacent to the panel.

By properly positioning things you can arrange that this rubber band engages firmly with the bevelled edge of the dial. It is obvious, then, that the dial may be rotated by means of this additional attachment and the whole arrangement forms an effective vernier dial.

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

If you want to have it so that coarse adjustment can be made first and a fine adjustment afterwards, you can introduce a small spring (with a washer at each end) upon the shaft and placed between the panel and the end of the ebonite sleeve adjacent to the panel.

The effect of this is to keep the vernier knob out of engagement with the edge of the dial when not required. When the vernier is required it is pushed forward into engagement with the edge of the dial and rotated whilst in that position.

### A.C. Measurements.

I often get letters from readers who are a bit hazy on the difference between alternating-current and direct-current measuring instruments. Frequently I have been asked why it is not possible to use a D.C. ammeter or milliammeter, for instance, for measuring the current in a transformer. So perhaps a few words on this subject may be useful.

In the first place, the direction in which the armature of an ordinary D.C. instrument moves depends upon the direction of the current. If the direction of the current be reversed the direction of movement of the armature will be reversed also. This means obviously that if ordinary alternating current is applied to an instrument of this kind, the instrument will indicate the algebraical sum of the currents, which in this case will be zero.

### Current or Energy?

If, however, we use an instrument which measures not current but energy, this will be independent of the direction of the current because the energy is proportional to the square of the current, and the square of a quantity is always positive whether the quantity itself be positive or negative.

This is broadly the basis of the majority of A.C. measuring instruments. One type of instrument, as you know, depends upon the heating of a wire by the passage of an alternating current, whilst another type depends upon the heating of a thermo-junction and the subsequent indication of the thermo-electromotive force generated.

There is, however, another type of measuring instrument in which an iron armature is used which is attracted into the centre of a coil by the magnetic field produced by the current and, as the system is without permanent polarity, the magnetic effect is independent of the direction of the current.

### Alternating Voltages.

The foregoing types of instrument, whilst they can be used, and are very extensively used, for the measurement of alternating currents, are in general not suitable for the measurement of alternating voltages, owing to the fact that their resistance is generally comparatively low and so they require a fairly substantial current to operate them.

When we use what may be called an electro-magnetic voltmeter we are really using a high-resistance ammeter and we are assuming that the current consumed by the instrument is so small that it does not appreciably upset the voltage which is to be measured. If the instrument, however, is

of a low resistance, this assumption will be incorrect.

Therefore, we must be sure that the electro-magnetic voltmeter is of a reasonably high (in some cases very high) resistance. This all goes to show that the problem with A.C. is much more difficult than with D.C., for with the latter it is quite an easy matter to obtain a considerable scale deflection with a current of only one or two milliamps.

### The Metal Rectifier.

Within the last couple of years, great improvements have been made in metal rectifiers, and they have been incorporated in A.C. measuring instruments with remarkable results. You will see at once that if alternating current can be effectively rectified by means of a low-resistance rectifier, and one which is very steady and uniform in its characteristics, then our problem resolves itself into the measurement of the resulting D.C. current, and this, as I have indicated above, is a very simple matter.

In fact, it is no exaggeration to say that the introduction of a really steady and

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reliable metal rectifier has marked a new epoch in the design of A.C. measuring instruments, both for current and voltage.

### A Neutralising Problem.

A curious case was mentioned to me by a reader some little time back in connection with a neutralised set which was drawing its H.T. current from a mains unit. Although you would not expect any polarity, or even apparent polarity, about the A.C. supply, the extraordinary thing was that when the set was connected to the A.C. mains one way the set could not be stabilised, whilst when the A.C. plug was reversed the set behaved itself properly.

At first sight you would hardly be inclined to believe this, but after a good deal of experimenting it turned out that the effect was completely got over by introducing an H.F. choke into one of the leads to the primary of the transformer.



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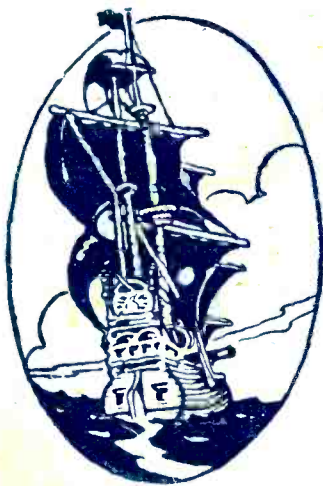
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