WINTER SPECIAL :: TWO VERSIONS OF 1934 ETHER SEARCHER

Amateur Wireless

and Radiovision

3d Every Wednesday

1934 ETHER SEARCHER

A New Member of a Family of Sets Famous Throughout the Constructor World

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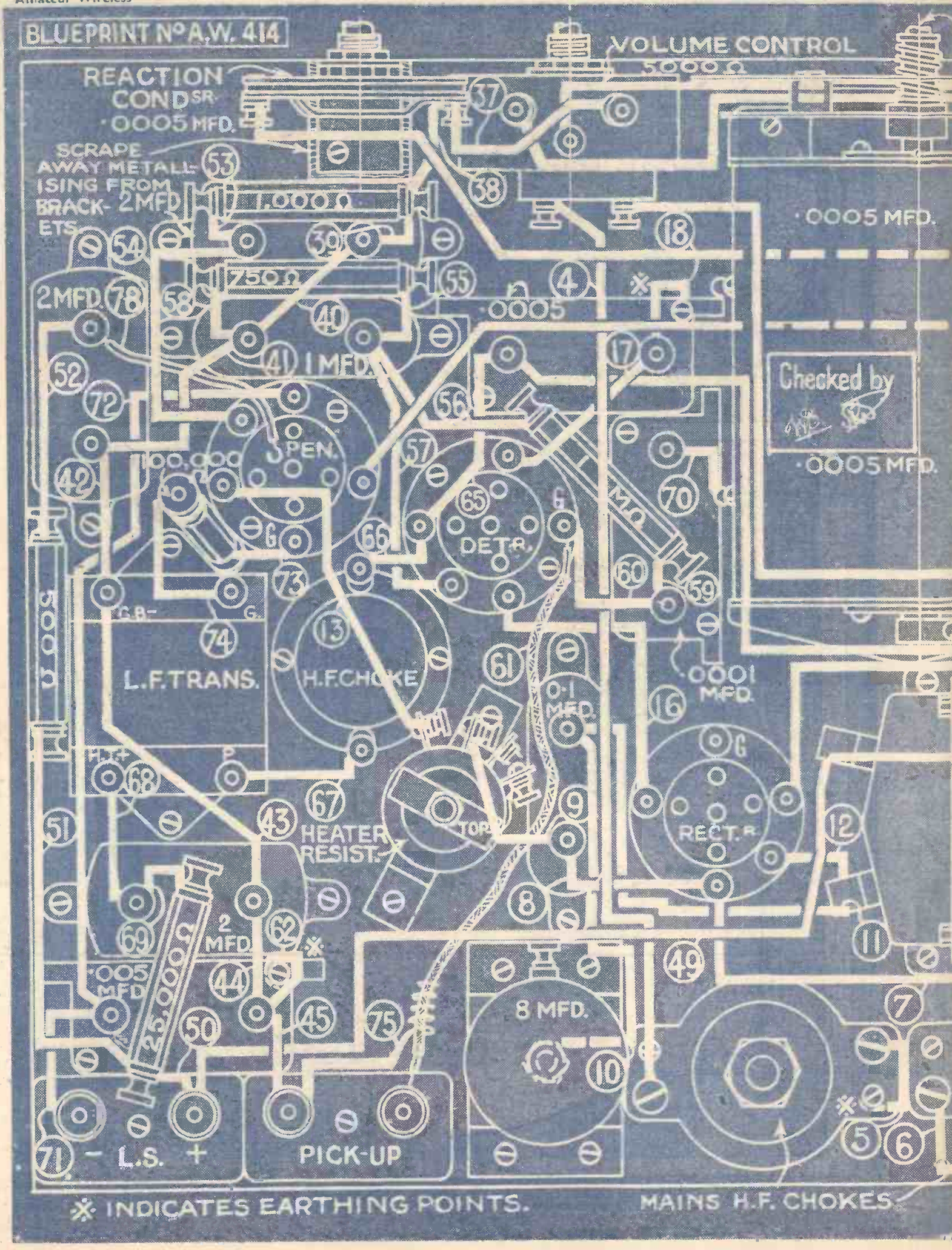
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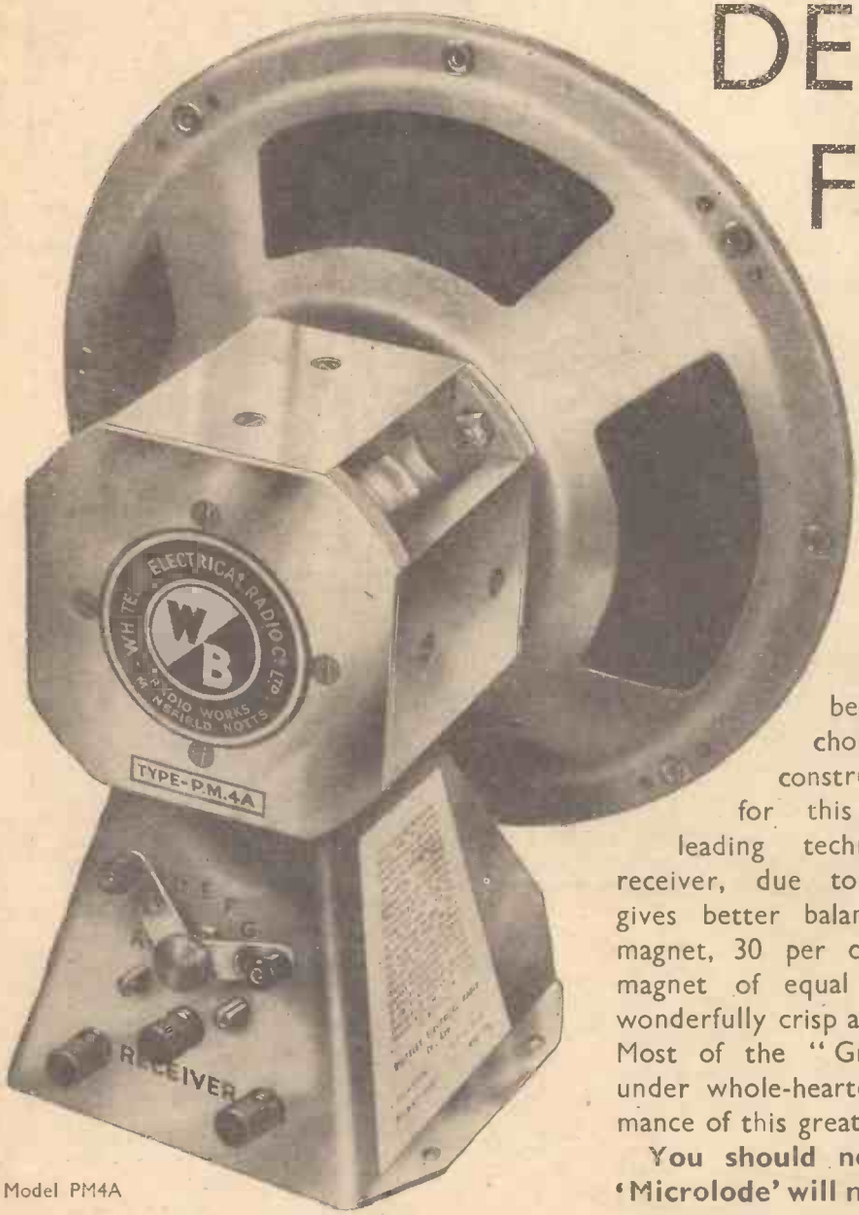

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Research Consultants: W. JAMES and PERCY W. HARRIS, M.Inst.Rad.E.

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News from Broadcasting House

By Our Special Commissioner

Exit London National!

NOW that Plan de Lucerne is in action we can look ahead to the next step in broadcasting upheavals. That will happen to us—the upheaval, I mean—some time next summer, when the Droitwich high-power station will take over the Daventry National service.

London National will be the first medium-waver to go. It will be shut down immediately the Droitwich long-waver proves its ability to give a reliable National service in the Brookmans Park area.

No Wavelength Sneaking

THAT there is a certain amount of distrust among European broadcasters is proved by the B.B.C.'s decision at no time to leave any of its wavelengths "free."

That is why London National is going first. At present it is synchronised with West National, so the exit of London will still leave us in full possession of our treasured channel.

For Midland Regional

AT last I can tell you which of the medium-wave Nationals is fated to become Midland Regional. None other than London National, which, refurbished and pepped up in power to some 70 kilowatts, will take its place at Droitwich by the side of the so-magnificent new long-waver.

The New Regionals

FOLLOWING the swan song of London National, and the vindication of Droitwich as the one and only National programme radiator, the West and North Nationals will dry up.

North National will become North-eastern Regional, housed in a dinky little station building, now being planned. West National will become the Highlands Regional, similarly housed.

That would seem to leave two free wavelengths. To nip any snaffling European's dirty work in the bud the B.B.C. will temporarily work its Newcastle and Aberdeen relays on these vacated National wavelengths.

New Regional Scheme

BY the end of this year, or perhaps by the very early part of 1935, the new regional scheme will be completed by the opening of the high-power North Ireland Regional at Lisburn.

Then the B.B.C. will be able to start spending money all over again on its television stations—which *must* follow.

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Morning Service Voices

MANY readers have asked me from time to time for the names of the good folk who conduct the morning services. There is no mystery about them.

The Rev. Arthur Buxton, the parson of All Souls, opposite the B.B.C., conducts two of them, the Rev. Hugh Johnson comes up from Cranley another two mornings, and the remaining two mornings are handled by the Rev. Pat. McCormick from St. Martin-in-the-Fields.

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New Role for Henry's Boys

YOU should make a special point of listening to the Theatre Orchestra on the night of January 30. On that occasion it will be specially augmented by members of Henry Hall's B.B.C. Dance Orchestra.

The conductor of this most unusual combination will be the well-known Constant Lambert—so again, I say, incline your ear.

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Notable Dates

THOSE of you who were intrigued by the wonderful mimicry of Beryl Orde recently, will be specially keen to know of her next microphone appearance. Well, I can give it to you. February 19. On that date she will appear in a music hall show.

By the way, I am glad the B.B.C. took my New Year's resolution to heart—and got together again with the inimitable Mr. Gillie Potter. He is starting up again on February 5, and will be "diagonalised" on February 7.

Winter "Specials"

These Valves Mean Better Radio !... ... ... PAGE 61

Short Waves Take You to the South Pole 63

Giving Class B a Sporting Chance 71

Noel Ashbridge on the B.B.C.'s Recording Systems (in an interview) 72

1934 Ether Searcher 73

Wiring Hints for the Amateur 78

Foreign Reception in 1934 ... 84

Making Your Mains Set Portable 88

Straightening That Aerial Pole 88

An Announcement by the Editor-in-Chief

THE announcement made on page 64 by "The Experimenters" is so important that I am giving myself the luxury of addressing the reader myself.

"A.W." in its very early days told its readers how to make certain components, but manufacturers rapidly took the opportunity of providing components of higher quality.

Indeed, the component manufacturer has given the public of his very best and the amateur has been only too glad to content himself with being an assembler of components rather than a "builder" of sets.

Now those energetic fellows, "The Experimenters," with their live and provocative articles, have made a distinct class of reader so inquisitive as to the vitals of a set that they are prepared to go to extra time and extra trouble to build certain of their own components, merely that they shall have that characteristic British pleasure of knowing that their sets are their own real handiwork.

The possibility of making certain components has fired these readers' imaginations.

Not for a moment do I feel that this keen type of reader will always want to make his own components. He well knows that the manufactured component is a remarkably high-class product designed and manufactured by people alive to all the difficulties and all the possibilities involved. But, for the time being, the home radio builder means to have the joy of making both components and sets from the raw material.

Good luck to the home radio builder!

B. E. J.

No More Circuses

NORTH REGIONAL was just on the point of concluding a date with the circus at the Bellevue stadium when all arrangements were abruptly broken off.

It seems that the R.S.P.C.A. stepped in and won over the B.B.C. to the idea of no more circuses.

There ought to be a Royal Society for the Prevention of Interference with Listeners.

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America Goes Psychic

OUR "Inquiry Into the Unknown" series will be taken by the National Broadcasting Company of America. They will hear Theodore Besterman's explanation of "How Psychical Research Is Done."

Andre Charlot

It is not quite clear yet if they will take the series by trans-atlantic phone.

◆

They Still Want Magic

TALKING to the box office man at St. George's Hall yesterday, I was amused at his description of the queer mistakes people still make—lots of them still think Maskelyne's magic is there.

It is quite common for people to ask for "two seats for to-night" and it appears that clergymen and women with children are peculiarly susceptible to this grave error.

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Charlot's Hour Again

UNCLE ANDRE, of Charlot's Hour fame, will be with us fairly often in 1934. The first of his new hours will be broadcast on February 5, and this will be diagonalised on the alternative wavelength on February 6.

Altogether, our beloved uncle has six distinct dates ahead, making twelve broadcasts if you count the diagonalisation.

"Songs From the Shows"

JOHN WATT has some good material up his sleeve for this revived series. On January 19 and 20 we shall hear Shaftesbury successes, and on January 26 and 27 Drury Lane.

We shall hear songs from such delightful shows as *Show Boat*, *Rose Marie*, and *The Desert Song*. Edith Day and a whole bevy of stars will be in this broadcast.

Hans and Franz

WHAT do you think of these "continentals"? Lots of fun, eh? They are no more foreign than I am. Just a couple of Englishmen—John and Norman Shelley.

Walford Hyden conducts their Merry Musick, and makes as good a job of it as he does with the Café Collette.

Walford Hyden

Radio Gossip of the Week

Our Winter Specials

HERE you are with the first of our two Winter Specials! Take a look at our contents and you will agree that there is something quite special about this issue. So there will be next week!

You must read all about the 1934 Ether Searcher. It again proves to be *a set that sets a standard*. And don't forget that for the first time in history you are offered two different practical layouts for the same fundamental circuit.

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"High Lights" of the Issue

KNOW all there is to know about valves? Probably not—yet. Turn to page 61, where we tell you about valves that mean better radio—and that, after all, is what we are all after, isn't it?

Have you given class B a sporting chance—or any chance at all? If not, the article on page 71 should intrigue you.

Listen-in to Noel Ashbridge on page 72. The Chief Engineer lets you into some B.B.C. secrets.

Before you wire up your new set read Percy W. Harris's article on page 78—it tells you all about wiring and soldering.

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Lucerne Plan in Action

AS we write the Lucerne Plan is still in the future, but you will have experienced it by the time you read these notes. Why not make use of our special chart given away last week on the inside covers?

◆ ◆ ◆

Tuning in Byrd

MANY short-wave amateurs are getting excited about the prospects of tuning-in the messages direct from the Byrd expedition at the South Pole.

At the base there is a 1-kilowatt short-wave transmitter, working on any wavelength between 14 and 80 metres. The messages will, of course, be relayed on medium waves from time to time, but the thrill would be a direct pick-up from so near the Pole.

Our article on page 63—"Short Waves Take You to the South Pole"—is very topical.

Making Your Own Lucerne Scale

LAST week, on the inside covers, we gave you a guide to the new Lucerne Plan wavelengths. If by some chance you happen to have missed last week's issue we strongly urge you to obtain a copy, because our guide has a special and individual value to every listener.

From that guide, to which we refer you now, you will see that there are two main divisions, one on the left for the medium-wave band and the other on the right for the long-wave band.

Let us consider only the medium waves, since the procedure is identical for each waveband. Taking, then, this medium-wave band you will find that we give three main columns. The centre column is a wavelength scale, going from 200 metres up to 550 metres, in steps of 10 metres.

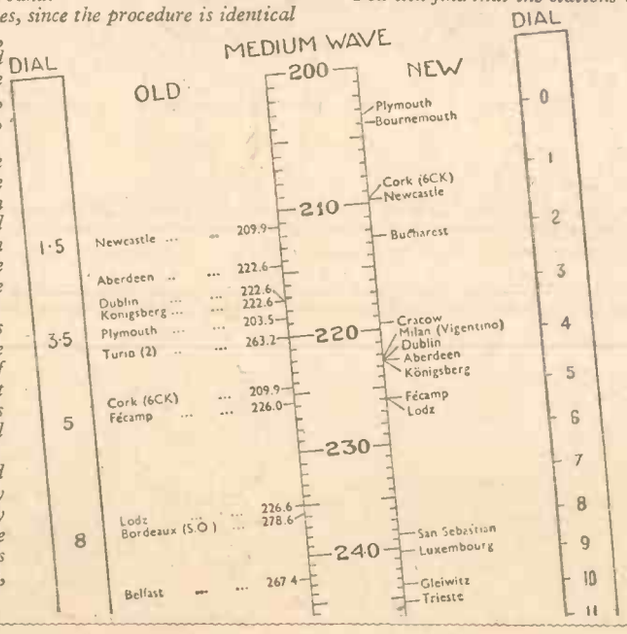
The column on the left is left blank and is intended to be filled in with the readings of stations as they come in on your own tuning scale under the old wavelength arrangement. The column on the right is intended to take the readings you get under the Plan de Lucerne.

Now the great value of our scale is that you can very closely get on the track of the positions on your dial of the stations under Lucerne Plan without actually going through all the tedious process of searching the whole dial during reception.

Here is how. Transfer all your old log to the left-hand column, as many dial numbers as possible being actually marked against their appropriate stations. Of course, many stations will come in at a fractional reading, but from such readings you can easily locate the unit numbers

In our example, arranged for a 100-degree dial, Newcastle gives us 1.5 Plymouth 3.5, Fecamp 5, Bordeaux 8 and Juan les Pins 11. With a ruler you can scale off the right-hand column with these key numbers and when you have enough of them you can then plan out a complete 0 to 100 or 180 degree scale down this right-hand dial column.

You will find that the stations are more widely spaced at the lower end than at the top end of the waveband, but it should not be at all difficult to arrive at the positions of each degree on your dial as represented by a number down the right-hand column.



Now, with your new scale ready, you have a very fine guide to the Lucerne Plan wavelengths. Because if you look to the left of the right-hand column you will find the names of all the stations arranged in their new order. Within a degree or so you can then tell immediately the actual dial setting for any station under the Plan de Lucerne.

You should note specially that this idea can be worked out for any dial, either 0 to 100 or 0 to 180, but when the readings have once been taken the prepared scale is not interchangeable for any other set. In other words, your guide is only suitable for the set from which it is originally prepared.

At the moment of going to press we cannot be sure that the long-wave changes will actually take place. Luxembourg and Koetwijk, are standing out, and they may cause a modification of the plan.

These Valves Mean Better Radio!

By KENNETH JOWERS

IN spite of all the ballyhoo about wonder valves, introduced to the general public many months ago, only recently has the ordinary amateur had a chance to handle them for himself. It is indeed surprising how few people to-day realise what exactly a high-frequency pentode is. And how many have ever heard of a double-diode-triode? Coming back to simpler valves, how many realise the advances that have been made in ordinary battery valves?

Improved Characteristics

During the past few months our modest valve makers have altered the characteristics of some of their valves without telling the general public anything about it. Such things as the amplification factor has been increased, while microphonicity—that annoying ponging sound you hear in the loud-speaker—has been almost entirely eliminated.

It is quite a common experience for a non-technical listener to get hold of a valve catalogue to see whether or not he can make any improvement to his set by buying a new set of valves.

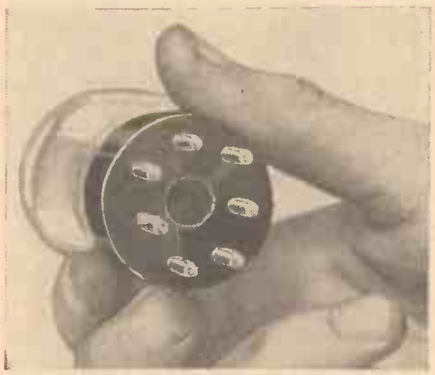
He looks for a detector valve and finds, for example, that the Mullard PM2DX he bought last year is still listed, a little cheaper perhaps, but otherwise seemingly the same. What he doesn't realise is that the only point about the new valve which is the same as the old one *is the designation*. He does not realise that the impedance has been decreased slightly, while the amplification has been increased to a great extent.

Wonderful Difference

As well as all this, the construction has undergone radical changes, and such things as filament emission have been increased. In practice this valve would make a wonderful difference to the performance and tonal quality of the average battery set in which the detector valve has been used for twelve months or more.

It is rather misleading to find that the new valve is apparently similar to the one you already have, but, believe me, if your present set suffers from detector overloading this valve will be the solution to your trouble.

Many years ago I had a lot of trouble with valves going soft and "blue glowing" very nicely, particularly if the anode voltage was a trifle on the high side. Sometimes during a programme the quality would gradually deteriorate and the only way the trouble could be overcome was to switch off the set and let



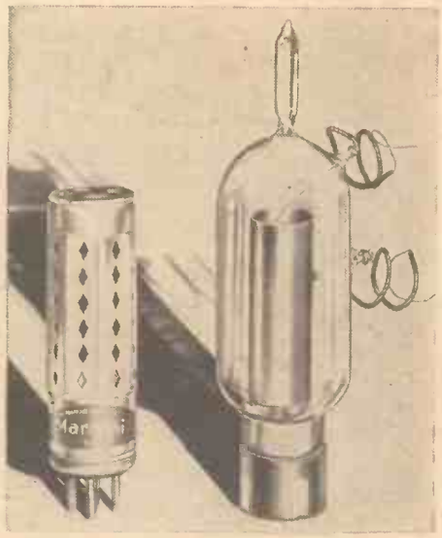
How the pins are arranged on a valve with a seven-pin base, such as a class-B valve

the power valve cool down, until it hardened up again.

This sort of trouble is now a thing of the past, but here again none of the valve makers seem to take the trouble to mention this vitally important point.

A few weeks back I was given the opportunity of seeing how Cossor valves are made, just what improvements have taken place, and the reason for the many improvements that had come about during the last year or so.

So many modifications and improvements



Compare the new Marconi Catkin mains valve with the old Round valve, one of the earliest ever produced

are made in the modern valve that it is not always possible to acquaint the general public with the new designs and it is not until you go and buy a new set of valves that you realise just what improvements have taken place since you bought your last lot.

Even then a number of people feel that the valves are not really better, it is simply that the old valves are worn out. How wrong they are!

Better Degree of Vacuum

When I was going round the Cossor works one of the first things I asked was how had they increased the degree of vacuum of their valves so that they did not go soft, even after being badly over-run. They took me round to the degassing plant, where all of the electrodes after being thoroughly cleaned were popped into an oven and heated to a terrific temperature—the metal is made almost white hot.

The idea of this is to make quite sure that no matter how much you over-run the valve the temperature of the electrode will not rise sufficiently to release any residual gasses and so cause a decrease in vacuum.

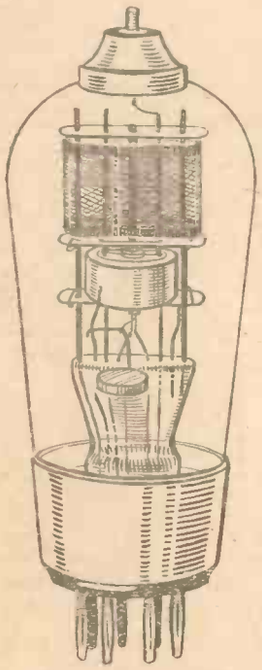
They showed me girls assembling electrodes, all of them wearing finger stalls, for after years of experience they discovered that the moisture from the operators' fingers was sometimes deposited on the electrodes, causing a decrease in efficiency after the valve had been in use.

As the number of electrodes in the modern valve is slowly increasing, the slightest trace of residual gas in the electrodes would cause loss of vacuum in a very short space of time.

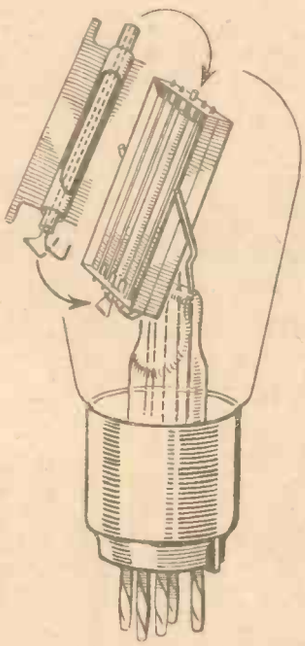
Assembling Double-diode-pentodes

I saw a girl assembling a whole mass of electrodes. I was told it was a double-diode-pentode, one of the latest valves to be offered to the general public. The idea of this valve is to provide distortionless rectification—that is for use as a detector—and to boost the weak signals from the diode so as to feed the output pentode or power valve without any intermediate valve amplification.

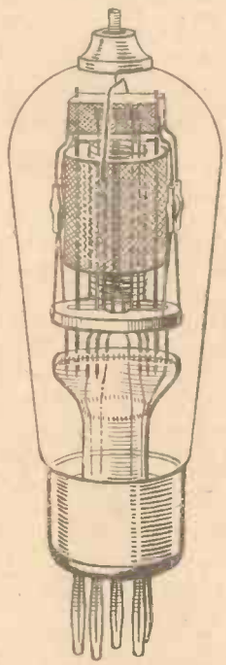
The remaining diode rectifies weak speech voltages to provide automatic volume control. This is the only valve of its kind and it does enable the home constructor to obtain results equal to those of the commercial receivers.



Mullard VP4 for high-frequency work



A useful detector valve—the Micromesh HL41



An Osram MHD4 high-slope detector

Electric furnace in the Cossor works for driving occluded gases out of valve electrodes

Perhaps the most interesting contrast is the new Marconi-Osram Catkin valve and the old Round valve made some ten or twelve years ago. The illustration of these valves shows that there are not two similar points about them anywhere, not even the valve pins. These Catkin valves are really useful.

A lot of people come along to me and say, "Is it any use my putting Catkins in place of my present mains valves? Are they any more efficient?"

Advantages of the Catkin

The matter of efficiency is not of primary importance. They *are* a trifle more efficient than the ordinary glass-bulb type, but the salient point is that there are three or four other reasons why a Catkin valve should be used.

Most of you at one time or another have either made up or bought an all-mains self-contained receiver with the loud-speaker within an inch or so of the valves. About 50 per cent. of you will have had trouble with microphony or a nasty boom in the loud-speaker.

Now if you had used a Catkin detector or screen-grid valve this trouble would never have occurred and your radio recepton would have been infinitely more pleasant. I think this is sufficient reason for your using this type of valve. In addition to this, they are almost unbreakable, and take up far less space if you are building your own set.

Ferranti's, whose name is always associated with high-grade components, decided a few years ago that if they were to obtain the maximum results from their receivers, it would be a very good idea indeed to make their own valves. Being set designers they knew from practical experience just what valves were wanted, what impedances to make them, what types were most important and what sort of valves were the best to give good quality.

Issued for General Use

As the valves were so successful it was quite impossible for Ferranti's to keep them for their own personal use so, before long, they decided to issue them for general use. And very glad I was. The range is now almost complete—high-frequency pentodes, triode power valves giving 2 and 3 watts, mains rectifiers, high-frequency pentodes and even pentagrids being available.

The Ferranti VPT4 is a valve that should interest everyone, for it increases the amplification of the high-frequency stage by an unbelievable extent. It can be used in almost any receiver as a high-frequency amplifier, as an intermediate-frequency amplifier in a super-het and even as a first detector.

One thing I do like about it—you can use it without upsetting the whole set; no need to take out the valve holder and half the high-frequency stage to get the valve in. If you have a set in which you feel you want more high-frequency amplification, that is better long-distance reception, try using one of these Ferranti high-frequency pentodes in place of your screen-grid valve.

If your existing valve is of the variable-mu type all you have to do is to plug in the new valve right away and in nearly every case you will find an increase in volume. In some sets in which this valve has been used the increase in selectivity has been most marked, but this has been due to the coils in use. The more efficient the coils the greater will be the improvement noticed.

Miss Pat Paterson, the actress, seems to be pleased with this outsize in Mullard valves!

It is surprising how many people rely on dry batteries for their high-tension supply. A number of friends of mine have inquired what is the best way to improve their quality and to obtain more volume. Instead of just *telling* them to alter their set to class B I have simply let them *hear* a little four-valve set of mine using a Cossor 240B and after that haven't any need to emphasise the point very much. I think the Cossor 240B was about the first on the market and it has certainly stood the test of time.

The one that I use at the moment gives an output of at least 2 watts with 150 volts high tension and with a good moving-coil loud-speaker the quality is quite on a par with the average mains set, in fact some people like it better because I am rather troubled with background noise from my mains. Very few people seem to realise that it doesn't need very much alteration to use class B.

Making a Simple Unit

Let us assume that you have a simple three- or four-valve set using one low-frequency stage, or in fact take any set using one low-frequency stage. You can make yourself up a little unit consisting of an input and output transformer, class-B valve holder with two resistances and couple this up to the loud-speaker terminals of your set.

Your original output valve is now converted into a driver and it is immaterial whether it is of the pentode or power type. Both will do quite well.

If you have got plenty of space, these new components can be mounted on your existing baseboard. The old batteries and accumulator are still used, no new ones are needed, and remember that with this type of valve you do not require any grid bias.

There is no doubt about it, that for the man who really wants quality and mains volume, a carefully balanced class-B stage is the only possible way of getting it.

The Marconi-Osram people make a very nice class-B valve, too. It is not quite the same as the Cossor 240B, as it requires a small grid bias of about 3 volts, but it certainly gives very good quality.

Holding the Electrodes in Position

The construction is rather amusing. The top of the bulb converges and grips the electrodes so that there is not any possibility of movement. It is a jolly good idea because with a large valve of this kind—which is two valves in one, remember—if you drop it it is very likely that the whole electrode system will be put out of alignment.

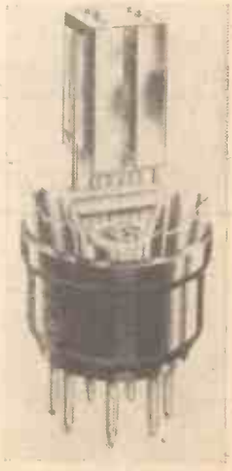
From the number of people who perpetually complain, about being on D.C. mains one would feel that they are not able to hear any wireless at all, but this is far from being the case. Just recently a friend of mine wanted to make himself a three-valve D.C. set so that he could dispense with his batteries and accumulators. He was rather worried because he wanted to use a pair of headphones for his mother, who was very deaf, and he understood

Continued on page 90

Electrodes of a Mullard PM2DX

The Ferranti VPT4

Cossor double-diode-pentode

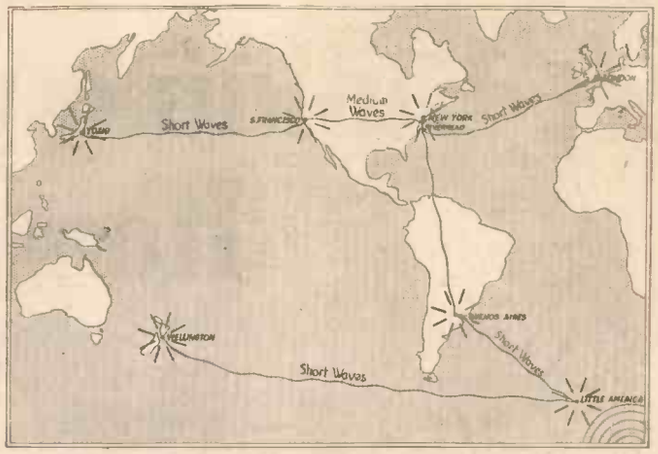


For class B—the Cossor 240B

Short Waves Take You to the South Pole!

During the present Byrd expedition, elaborate arrangements have been made to keep the world informed of the progress of the discoveries. So complete are the radio networks that it is quite possible you will be able to hear the explorers when they are right over the South Pole.

Rear-Admiral Richard E. Byrd, leader of many famous expeditions, has just arrived in Antarctic regions



Map showing how the South Pole will be in radio touch with the whole world during the Byrd Antartic Expedition

SEVENTY-FIVE degrees below zero! Imagine radio at that temperature—and then be thankful that you can hear the South Pole calling while you are snug in bed with a hot-water bottle on your toes.

Rear-Admiral Byrd and his expedition have just arrived in Antarctic regions, and have made their base at a spot familiarly known as Little America.

Although the previous expeditions led by Byrd have been equipped with radio, it has not been possible to maintain touch with the outside world so completely as the present expedition intends to do.

Complete Radio Installation

About three months ago, the supply ship "The Bear of Oakland" went off in advance with the necessary stores for the expedition as well as the complete gear for a very complete radio installation, including transmitters and receivers, direction-finding apparatus, and even spare aerial masts.

Later Byrd followed in another ship, "The Jacob Ruppert" with further wireless gear, an aeroplane, and such polar equipment as dog sleds. He went with a most ambitious plan to tell the world of his experiences in the air and, perhaps, actually at the South Pole.

The world is to hear this thrilling account from Byrd's own lips as he stands before the microphone at the base at Little America.

You will not hear this broadcast direct from the base, but it will be relayed, via short links, to almost the entire world. The nearest station for reception by listeners in this country is W2XE, New York City, on a wavelength of 49.02 metres.

Let us take a peep at this Antarctic base, from which we can, with a suitable short-waver, hear Byrd's own story of his latest exploits over ten thousand miles away.

The main transmitter is a 1,000-watt short-waver, with a call sign of KFZ. At the moment I cannot tell you which is the best wavelength to tune-in to. Byrd's wavelengths vary at times between 80 and 14 metres.

Richard Watson, one of the operators of "The Bear of Oakland," tuning the combined long- and short-wave receiver—just a part of the elaborate radio gear on board

"The Bear of Oakland," one of the two ships forming the second Antarctic Expedition under Rear-Admiral Richard E. Byrd

There will be a forward base station closer to the Pole with a call sign of KFY. This station is intended, primarily, to pick up and relay to the world transmissions from the aeroplane and dog sleds in their efforts to reach the Pole itself.

I ought to mention that the 'plane and dog sleds are equipped with 75-watt transmitters, so that they can keep in touch with the base in the event of losing their bearings. Contrast this elaborate radio contacting—with which it is almost impossible for the various units to become lost—with the expeditions of last century, led by such pioneers as Franklin—who lost all contact with the outside world for over two years, and whose individual members were lost for six months at a time.

Broadcasting from the Pole

Nowadays, radio has changed the whole complexion of Polar exploration. The radio operators at the base can keep in constant touch with the remote units of the expedition. It is Byrd's ambition to broadcast the remarks of his pilot when he is circling over the Pole.

How this wonderful radio contact with the outside world will be made can best be understood from an examination of the accompanying map. You will see that there are two nerve centres making this relay possible. One is Buenos Aires and the other is the General Electric Lab. just outside New York.

Short-wave broadcasts from the main base or from the outlying units *via* the base, in Little America, will be picked up at Buenos Aires, and, thereby, connected to the International Telephone Service for re-broadcast to Riverhead, Long Island. This is situated 85 miles from New York, and this short distance will be bridged by land line to the Columbia studios there.

From that point the programmes will be re-distributed throughout the whole of the Columbia broadcasting chain of 59 medium-wave stations for the benefit of the whole American continent. It may also be relayed to the Canadian stations.

The short-wave stations W2XE at New Jersey will broadcast for reception in Europe if conditions are favourable, various medium-wave European stations will take on re-broadcasts for listeners on this side.

The Columbia people have made arrangements to link up with San Francisco, either by land line or radio, for direct transmission to Tokio, where the messages will be on tap for the Japanese listening public.

Broadcasts from Little America will be picked up without intervening relays at Wellington, New Zealand, and thence re-distributed over Australasia, and, if necessary, to Tokio, should the link from San Francisco fail.

By means of these various contacts by radio and land-line, the Byrd expedition will be in touch with practically the whole of the English-speaking world. While Byrd is at the South Pole—or at any rate, in Polar regions—defying the cruel rigours of that terrifyingly cold part of the world, you, in the comfort of your own home, will most likely be able to hear the aeroplane as it goes over the Pole. K.J.

A New Feature for the Home-builder

Set Building with Your Own Home-made Parts

By The Experimenters

SINCE we began our articles for AMATEUR WIRELESS some time ago, our post bag has greatly swelled with letters from keen enthusiasts. We have been glad to get these letters, because they have given us a real insight into the needs of the wireless amateur of to-day.

We have been forced to the conclusion that there is a great and crying need for more inside information about the technique of radio. Readers who have written to us have nearly all displayed a lively desire to get to grips with radio theory—quite apart from their obvious craving to experiment with circuits and sets.

Held at Arm's Length

For some time we have held at arm's length those who have begged us to give them information on making up radio components. We have refrained because we know full well that on the market to-day are components to suit all requirements—and all pockets, too.

These component parts, such as coils, condensers, transformers and chokes, have been evolved after ten years of experimentation to meet the needs of the home constructor. What perhaps is not so widely appreciated is the fact that the constructor who started with broadcasting ten years ago was in a much better position to learn radio from the inside than is the newcomer to radio to-day.

Whereas the old hand grew up with the component makers themselves, sharing with them their successes and failures—and knowing the reason why, all the time—the newcomer finds everything cut and dried. He finds, this newcomer to the great wireless game, that home construction has been made so easy that he does not have much chance to learn about the theory.

Tremendous Urge to Learn

Now we know perfectly well that there is a tremendous urge to learn more about wireless, especially among the younger recruits—the fifth-form schoolboys who are a bit of a dab at physics, the undergraduates, the night-school students. Home construction, fascinating pastime though it is, does not always give full scope to this entirely separate group of amateurs who really want to understand how the set works.

They are not content with dry-as-dust text books. Such a method does not appeal to them as being a very interesting or conclusive way of learning about wireless. No, they want to be up and doing—to learn their theory in practice, so to speak.

There is no real reason why, side by side with the home constructor, we should not cater for the radio home builder—for the man who wants to do more for himself so that he can the more completely understand how the set works. There is no better way of acquiring such knowledge than by making up coils and other components for yourself.

Having made them you can alter them and note the effect of the alterations on the performance of the set. The lessons you learn from such experimental work will be invaluable. Augment this personally acquired knowledge gained through practical experiments with one or two good theoretical text books and you are well on the way towards your goal—towards the goal of a thorough understanding of wireless.

It is not too far-fetched a theory to suggest that, when through our experimental school of experience you have learned your lessons, you will graduate towards the home-constructor class—to the class of reader who has enough knowledge to enable him to pick out a published design to meet his special needs.

Meantime, though, if you are one of these experimentally inclined amateurs, you will have an absorbingly interesting time making up all kinds of components and incorporating them in sets we shall describe.

Now the cat is out of the bag. Yes, we have decided to give you a series of articles on making your own parts. Incidentally these components will be very cheap. That is natural, since all labour charges—no small item in the marketing price of any commodity to-day, remember—will be against yourself, and all you will have to pay for will be the very inexpensive materials, such as wire, bobbins and formers.

You will be interested to know that we have already designed an efficient tuning coil, which we will describe next week. After that we will give you details enabling you to make up other components designed for this series.

When we have given you enough information to enable you to make up as many "makeable" components as possible—we are ruling out variable condensers, for example—we propose to give you the design of a complete set.

Thrills—and Thrills!

Think of the thrill of building up a set incorporating so many parts of your own making! And the even greater thrill when the set works—and works amazingly well! We ourselves have progressed a long way in this series and already we have before us a three-valver using the points whose constructional descriptions start next week.

In many ways we think this series is the best thing we have attempted for the wireless amateur. Its inspiration can really be traced back to those kindly amateurs who have taken the trouble to write to us from time to time, thereby giving us such a clear understanding of the needs of the wireless fan of to-day.

Broadcasting in New York

By Our Special Correspondent: LIONEL MERDLER

WE hear so much about the advertising part of American programmes on this side that we are apt to regard their whole system as intolerable. If a casual glance is thrown over their daily programme, there is little that is reassuring, and yet to the average New Yorker there is presented an absolute gold mine of entertainment.

I had a Strombeg-Carlson receiver, a room to myself, central heating, and half an hour to spare. Let's see what's on the air.

Switch on, wait for the tubes to warm up, and start at zero on the dial, marked 1,500 kilocycles or 200 metres.

Turn up the volume and in comes an orchestra—WWRL. Not a bad start, and pretty good quality, too, for an American set. Round to 222 metres, WBNX—piano accompaniment to a male voice. Keep the volume control down for these locals; 231 metres, WEVD—piano with a sentimental lady.

Ha, this gives us what we are looking for—bold, blatant advertising from WINS (254 metres) thrown over a background of light tea-time orchestral music. This presently swings into full volume. Very pleasant, but as we don't have tea in the States on we go to listen to one of the serial thrillers, a type of play very popular just now.

This comes from WRNY, on 297 metres. It sounds exciting, with plenty of banging noises, but as we have missed the earlier serials it doesn't mean much. Bit of Russian here, a Bailalika orchestra with plenty of vim from WABC, 349 metres.

Here's a contrast! Hawaiian guitars from WNYC, at 370 metres, just a slight flick of the dial. DX fever has us now, and we tear ourselves from the Hawaiian guitars to WOR, 422 metres, another radio play—they must be popular!

On again to WEAP, 454 metres, to hear some of the adventures of Tom Mix.

No more advertising? Yes, here we are; WPCH, on 526 metres, telling us to buy a 1934 motor-car because it is 100 dollars cheaper than last year. "Come on there, let's go. You can hear Bing Crosby to-night, he's crooning at eight-thirty." Click, it's all over.

That's American radio. All those stations were coming in like local stations, with low background noise; a choice of a dozen stations or more, each one giving a different programme!

The advertising? Well, as you see, it takes up only a small percentage of the total time, and the folks here seem to get used to it; listen to it, just as we read an advertisement in the newspaper.

Please Mention "A.W." When Corresponding with Advertisers

On Your Wavelength

By Thermion

Five-bob Battery's End

THE five-shilling 120-volt battery of which I was given such wonderful accounts has not proved on the test bench to possess any remarkable properties. It was tested, if you remember, by being run for four hours a day through a fixed resistance which made the current 10 milliamperes when the battery was brand new. With falling voltage the current naturally declined also. It was down to 80 volts, or 1 volt per cell, in twenty-six days, and I should regard it then as completely "done."

However, I continued the trial until the voltage had fallen to nine-tenths of a volt per cell, which is the usual minimum for laboratory tests. A reading of 72 volts was reached in a further 6½ days. The battery's extreme service life is thus shown to be 32½ days, or 130 hours.

Running Cost Figures

HOW do the running costs work out for this "bargain" battery? There are sixty pence in five shillings (said he, being bright at arithmetic), and if we regard the battery as done for when the voltage is 1 per cell, its life is 104 hours, which is roughly three-fifths of a penny an hour. At four hours a day this works out to £3 13s. a year.

But suppose that we regard nine-tenths of a volt per cell as the limit. We have then 130 service hours and the cost per hour is just under a halfpenny. At four hours a day this brings the year's expenses for high-tension to £3.

I have no hesitation in saying that they would be a good deal less in either case if batteries of first-rate quality were used, and smaller still if triple-capacity batteries were substituted for the standard-capacity size.

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Radiotaxis

WOULD you believe it? Some of the largest American taxi-cab companies are installing wireless sets in their taxis. I am not joking. I have just been reading a serious article on the subject in one of the most severely technical of American wireless magazines.

I am all for wireless, and lots of it, in the right place and at the right time; but, frankly, I don't want it in my bath, in my railway compartment, or in my taxi.

Americans seem unable to live without an accompaniment from the loud-speaker. They arise in the morning to the strains of organ recitals, and then perform physical jerks under broadcast instruction.

Wireless is with them all day, and almost the last thing they hear before closing their eyes at night is the "slumber music" from the studio.

The Switch-on Seat

THE article about radio in taxis is largely concerned with methods of switching on when the passenger hires the vehicle. Under one system at present in use the driver's flag controls the switch, turning on the "juice" when he lowers it and disconnecting the set when he raises it again at the end of the journey.

"Amongst the objections to this arrangement," I read, "is the one that drivers soon discover how to close the starting contact without lowering the flag."

The finest device of all seems to be one with which several important taxi companies are now experimenting. When the passenger sits down on the rear seat cushion he closes the contact, disconnection being automatic when he rises again. It rather reminds me of those squeaker things that you used to place under uncle's chair cushion when you were very young.

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Two Broadcasts on One Wavelength

"NOTHING new about that," the reader may say; "I have known as many as six on particularly jammy nights." No, dear reader, I am not talking about what happens when one station wanders gaily on to the wavelength of its neighbour.

Real honest-to-goodness experiments are at present in progress in Holland with the simultaneous broadcasting of two programmes, neither of which jams the other, on a single channel. The process is known as "paired Transmission."

It works in a most ingenious way, which I will describe briefly in a moment. Up to date very encouraging results have been obtained, and if only the idea can be perfected it may go a very long way towards solving the problem of the overcrowded ether.

In-and-out Transmissions

AT the "paired" broadcasting station there are two separate transmitting plants whose output is connected in turn for brief instants to the aerial. Actually the sets are switched on and off by means of a local oscillator which applies a paralysing grid bias to each in turn.

Thus at any instant only one of the two transmitters is at work. A minute fraction of a second later it is silenced and the other is in action. At the receiving end a similar oscillator switches on the set only at those instants when the desired transmission is coming through. Either programme can thus be received—in theory, at any rate—clear of the other.

Stanley Holloway, of "Pick Up Thy Musket" fame, is seen here in policeman's uniform, taking part in a "shot" for a new film. Note the Marconiphone window display!

Naturally, there are many snags to be overcome. The makes and breaks, for instance, have to be so timed that they cause no interference with the programme. I believe, though, that we shall hear a good deal more of "paired" transmission in the future.

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Exit Prague, Enter Lucerne

AS I write, the old Prague Plan has only a day or two to run, and when you read this note you will already have sampled its successor, the Lucerne Plan. I have never taken the view that the coming of the Lucerne Plan would lead inevitably to chaos and, despite all the risks that accompany prophecies, I stick to my guns.

I predict that this very evening you will be able to receive without interference just as many stations as came your way a week or a month or a year ago. But don't expect too much at first.

Europe's stations have been used to pretty wide wavelength tolerances, and we can hardly hope that they will suddenly reform and settle down all in a moment to a maximum permitted deviation of 50 cycles.

Give the Plan Time

DURING the first few days, or perhaps for several weeks, a certain amount of mutual interference is almost inevitable. Some of the older plants are probably utterly incapable of keeping within 50 or even 500 cycles of their allotted wavelengths.

As week follows week, conditions will improve and, unless something unforeseen occurs, I believe that the Lucerne Plan will be a genuine success. It is more than likely that most, if not all, of the countries which have not signed the agreement will in self-defence adopt their allotted wavelengths.

They may try a little free-lancing at first, but they won't find it very successful so long as the rest present a united front. It is no good trying to find a wavelength of your own if there isn't one to be had.

Don't Panic Over Your Set

IF you do find interference fairly widespread (though I don't think that you will) during the first days of the Lucerne Plan's existence, don't jump to the conclusion that your set is hopeless and start forthwith to disembowel it. The interference, provided, of course, that your set is of fairly recent make and reasonably selective, will probably be due to causes over which you have no control.

In any case, should a higher order of selectivity be required than is necessary at present it will be possible to bring many sets up to date and you can be sure that AMATEUR WIRELESS will keep you posted in this respect.

Modern sets should do all that is required. The most selective of them are designed for a 9-kilocycle separation between medium-wave stations, and that is the minimum separation on this waveband under the Lucerne Plan.

So things shouldn't be so bad, after all.

'Ware Cheap-jack Sets

CERTAIN American sets of what is known as the midget type are being dumped into this country at a price, including shipping costs and customs duty, which works out in shillings rather than in pounds. Don't be tempted by such things if you are offered them.

If they were any good they would not be sent over here at give-away prices. Don't forget, too, that if these things break down, as break down they will, it will be impossible to get them serviced, whilst new components for them will be unobtainable.

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Puzzled by Fading

HOW many correspondents have written me perplexed letters about fading I don't know, but the number must run to a pretty large figure. Many of their letters are on these lines: "My set has taken to fading very badly lately. I have tried new valves and new batteries, but these have had no effect."

It is difficult to make the man-in-the-street realise that it isn't the set that fades, but the signal. The only cure is self-adjusting volume control, but it is not every set to which this can be fitted. Further, even self-adjusting volume control cannot deal with the very violent type of fading in which signals disappear altogether at intervals.

Effects of Reaction

SOME time ago I pointed out in these notes that, when there was fading about, a set which relied upon the rather critical use of reaction would be worse affected than one which made no use of feed-back. Owing to the way in which it works, reaction, particularly if used almost to the limit, magnifies the effects of fading. An interesting instance of this came my way the other day.

A friend who lives quite close to me complained that on the previous evening Hilversum had been fading quite badly. I had been listening to the station at the same time and I had found no noticeable fading. His set is one which gets every ounce out of its valves by the critical use of reaction, whilst the one that I was then employing was a super-het without reaction and also without S.A.V.C.

A Point About S.A.V.C.

IT is not always realised that self-adjusting volume control cannot cope with fading if a station can be received only with the manual volume control full cut when its strength is normal. The reason, when you come to think of it, is obvious. All the amplification that the set possesses is required for the station even when it isn't fading.

S.A.V.C. cannot increase the available amplification; therefore it is incapable of preventing fading in such cases. If, though, you have such a reserve of amplification that there is plenty in hand when the station is at normal strength, S.A.V.C. will keep the volume level, unless, of course, a signal fades right out.

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Luxembourg to Comply?

IT is reported that the Government of the Grand Duchy has ordered the owners of the Luxembourg broadcasting station to adopt the wavelength of 240.2 metres assigned to it under the Lucerne Plan. If this is so it will become possible to operate the long-wave portion of the Plan, for Huizen can continue to use its present wavelength of 1,875 metres, since Brasov is not yet ready to transmit.

The only non-assenting station of importance would be Motala and, as there are several wavelengths going abegging pending the erection or completion of the stations to which they belong, the Swedish station should be able to fit in without causing interference.

Luxembourg, if it goes down to 240.2 metres, will probably be very well received. Nurnberg has been working on something near that wavelength for many years now and has always been one of the best of European transmissions, despite its small power.

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Flying by Radio

THE tragedy of the air-liner Apollo which crashed at Ruysselede while trying to find its whereabouts in dense fog makes one wonder why more use is not made of the American plan of charting the main air-routes by radio. The idea is to guide each machine from start to finish along a clear-cut "beam" of wireless energy.

So long as the pilot receives a certain signal note he knows that he is holding the correct course, but should the 'plane stray to one side or other the signal changes and from the way in which it changes the pilot knows at once whether he must steer to port or starboard in order to get back on the proper track.

The scheme is helpful in all weather conditions, but it seems to be essential to safe flying by night or in fog. The pity of it is that the Apollo collided with a wireless mast of all things and so "crashed" through an agency which, under happier circumstances, might have proved its salvation.

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High Endeavour

JUST now all the best brains in radio science seem to be engaged in the lofty pursuit of investigating the Stratosphere, Ozonosphere and Ionosphere—all of which are at heights varying from 20 to 150 miles above the heads of ordinary folk.

Their importance from the wireless point of view, of course, lies in the fact that they contain those mysterious "reflecting" layers which alone make long-distance signalling possible. The more one gets to know about these regions—and our information is growing fast—the more amazing they seem to be.

For instance, the Ozonosphere is a belt of practically pure oxygen, high above the ordinary atmosphere, which shields us from the most intense and harmful of the ultra-violet rays from the sun—and in doing so breaks up into ozone and free electrons—the latter forming part of the reflecting "ceiling" for the longer wireless waves.

The Ionosphere is a still higher region which "traps" other solar radiation to form the Appleton Layer and reflect back the shorter waves. The third and lowest region—the Stratosphere—has already been invaded in person, first by Professor Picard in his famous balloon and then by the Americans and Russians, whilst a similar expedition is shortly to be launched in this country.

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When Valves Fade Away

IT is always a sad moment—and painful for one's pocket—when a good valve and true gives up the ghost, but it is as well to be able to recognise the symptoms of decay—and so prevent waste of time in making a futile search for other possible causes of failure.

With a battery-driven set there is seldom any room for doubt, because the valve dies suddenly and decisively, but with the all-mains set the signals gradually peter out, particularly if, as is usually the case, it is the filament that goes west. Of course it is all over in a second or two, but it is definitely a more lingering death than with the battery-driven type. The reason is that in a mains-driven valve the filament retains sufficient heat to send feeble current through to the plate circuit for a little while after the filament wire has broken.

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Question of Volume

DESIGNERS very naturally set great store on the ability of a set, including the loud-speaker, to reproduce a wide range of frequencies without distortion. Perfection points to a lower limit of 30 and an upper limit of 15,000 cycles per second, but in cold practice a straight-line response from about 75 to 7,000 represents very good going.

A set should also, of course, be able to handle large variations in volume without overloading. In this connection a series of experiments was recently made in order to estimate the relative energy-values of various kinds of music and different forms of noise. In one particular instance a combined orchestra and choir, numbering 365 performers in all, were pitted against the full-blooded roar from a lion in the local zoo. Measurements showed that the total intensity of the human "roar" was barely six times that of the single lion.

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H.F. in the Garden

ONE hears from time to time of the advantages to be gained by treating growing crops with electricity. I have never quite understood why, though I know one man who trained his French beans along a metal fence specially fitted with an elevated wire "to catch the broadcast waves." And in fact he got a very fine crop—though I am not putting that forward as evidence.

An Italian investigator has now succeeded in showing that the application of high-frequency currents does in fact stimulate growth by creating an alternating voltage across the tissues of the plant. This tends to excite the cells and so forces the sap to rise by electro-capillary action. Verb sap!—one might add.

Giving Class B a Sporting Chance

R. W. HALLOWS has something important to say about high-tension requirements

THOUGH a great deal has been written about class-B amplification, little attention has been focused on certain very important points affecting the high-tension batteries used with it. The class-B circuit is often described as a battery economiser—and so it is up to a point.

For instance, if you are now using a push-pull output circuit or a single super-power valve or power pentode, a change-over to class-B will effect a big reduction in your high-tension current, enabling you to obtain greater volume from the loud-speaker. But suppose that your present output valve is one of the small-power class, such as the LP2 or the 215P; the driver and the class-B valve will require between them an average current just about equal to that of your former valve. They will, however, be able to handle vastly greater volume.

It boils down to this. For class B you must count upon an average current for the driver and output valve of between 7 and 12 milliamperes, according to the valves used and the output that the "B" valve is driven to give. Add on the current consumed by the other valves in the set and you will see that you cannot keep the drain on the high-tension battery much below 11 milliamperes.

Is it Good Enough?

This may not seem very serious, for the average three-valve set unprovided with class B requires from 9 to 11 milliamperes. Therefore, it might appear at first sight that the high tension battery that will work an ordinary three-valve set should be good enough to operate a class-B set drawing the same amount of current. But is it?

Probably ninety-nine battery users out of a hundred waste more good money on high-tension batteries than on anything else that they buy. I know that they won't believe me, for a moment, but I will try to show them why. They throw money away simply because they will purchase batteries of standard capacity size—and often cheap and nasty ones, at that—for operating sets containing three valves and upwards.

From a pint pot you cannot obtain more than a pint; from the little cells used in standard-capacity batteries the utmost amount of current that can be taken economically is 5 milliamperes—and that is assuming that the battery is of the very highest quality. Double the load and you must divide the service hours that the battery will give by three or even four.

A triple-capacity battery costs about one and a half times as much as a standard, and its life under a load of 10 or 11 milliamperes is from four to six times as long. Do you see now what I mean by throwing money away on small batteries?

But, says the reader, my standard-capacity batteries last me four months, though I admit that I am not using class B. To this I answer that it all depends upon what you mean by "last." Have you ever taken the voltage of your battery when it has been in use for, say, three months. The voltage must be taken under load—that is, when the set is working—and if you will measure it I think that you will obtain a surprise.

You have been putting up, in other words, with appalling quality (or alternatively with minute volume) for some little time. A set without class B may work in some kind of way even when the high-tension voltage has dropped to 30 volts or so.

But the class-B set is a different business altogether. Here the best working voltage is 120, and the set cannot possibly do itself justice when it falls much below the 100-volt mark. How long does a standard-capacity battery take to drop to this reading?

On my table as I write is a five-valve set incorporating class B. It has been under test for exactly four hours, and not four hours on end. It has been run actually for four periods of one hour each on four separate days, and the battery has therefore had ample time to recover. The voltage reading when it was first brought into operation was 135; and what is it now? A high-resistance voltmeter shows that it is 110. The voltage will not fall quite so rapidly from now onwards, but I don't give that battery more than another twenty or thirty hours of useful life at the outside.

It isn't the battery's fault. It is doing its best; too much is being asked of it.

Have you ever thought why it is that a high-tension battery loses its voltage? The chief reason is that the internal resistance of the cells increases. In a new standard-capacity battery of good quality this resistance is a mere fraction of an ohm per cell or, say, 25 ohms for an 80-cell battery giving nominally 120 volts.

But when the battery is called upon to do more than it should the resistance rises rapidly and may reach 5 ohms per cell, or 400 ohms for the whole battery, in a surprisingly short time.

It is well known that if we are to avoid distortion in class B the resistance of the output choke or transformer primary must be kept down to something small—500 ohms is the absolute maximum and a lower figure is much better. Now, what is the use of keeping down this resistance if you go and place in series with it a battery resistance of several hundred ohms? Distortion must result.

The larger capacity battery has a lower initial resistance and if you take 10 milliamperes, or even more, from it its resistance remains smaller than that of the standard-capacity battery.

Consider now the kind of load that the class-B valve imposes on the plate battery. The standing current is small, but on loud signals it may peak to 20 or 30 milliamperes. The peaks endure for only an instant, but unless quality is to suffer the battery must be able to recuperate from these loads without the slightest delay. If it cannot, succeeding peaks will fail to reach their proper heights and again distortion must occur.

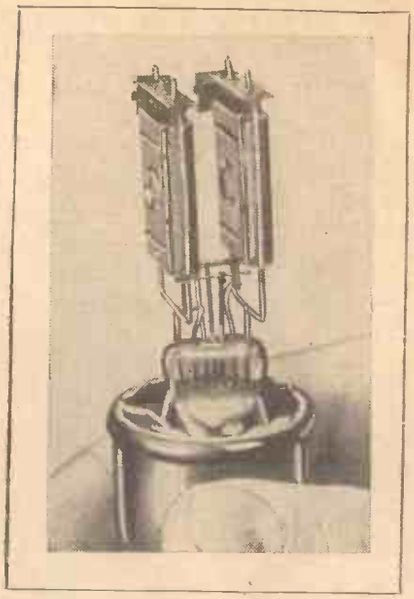
Quality of Batteries

This is where the question of better quality comes in. Should you disbelieve, as quite probably you will, all that I have said about triple-capacity batteries, I would ask you to remember that there are many different qualities among standard capacities.

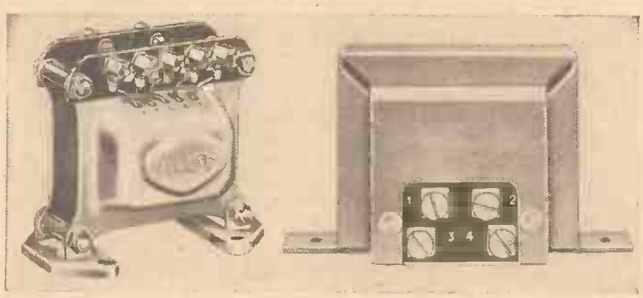
You can buy them at any price between about 5s. 11¾d. at the cheap-jack shop and £1 or so for the 120-volt size.

Believe it or not, one of the chief ways of saving money in the manufacture of cheap batteries is in the use of low-grade, and therefore ineffective, materials for the depolariser. The depolariser, by the way, is contained in the little bag that surrounds the central carbon rod of the cell and its business is to prevent the rise of internal resistance.

Go in for cheap batteries for your class-B set and you are asking for a horrible kind of distortion. Buy batteries of good quality and remember that the truest economy is to purchase those of such a capacity that they can easily stand up to the load imposed upon them.



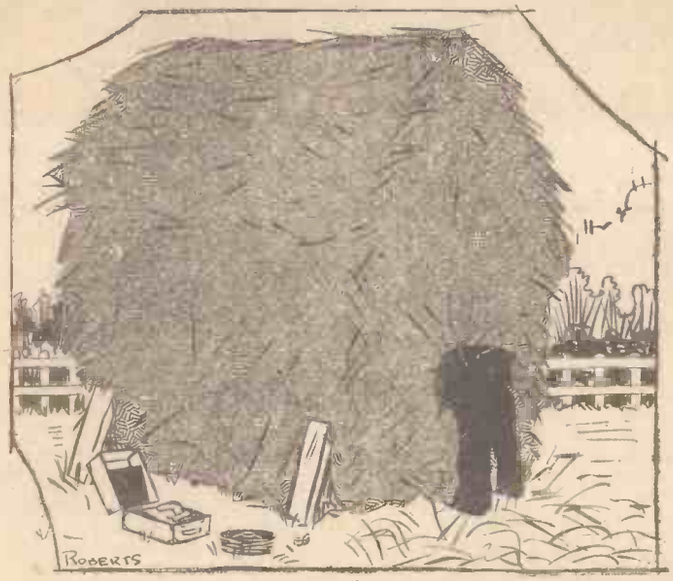
Most class-B valves are provided with a seven-pin base. They are discussed in the article on page 61.



Most component manufacturers produce special driver transformers for class-B amplification. Here are two typical examples from Wearite and Benjamin

Noel Ashbridge on the B.B.C.'s Recording Systems

(In an interview with LESLIE BAILY)



Christopher Stone searching for a needle in a haystack!

WE are hearing a lot just now about Eric Maschwitz's plans for radio variety in 1934, about Val Gielgud's scheme for new radio plays and Adrian Boult's aims in broadcast music for the New Year; but the most responsible Departmental Chief in Broadcasting House so far as epoch-making changes in 1934 are concerned is that modest, calm, self-effacing little man whom they affectionately call "Chief."

"Mr. Baily wants to ask you some questions about recording, Chief," said my "chaperon" from the B.B.C. Press Department, who had introduced me into that spacious and elegant suite of offices on the seventh floor at Broadcasting House wherein the Chief Engineer spins his schemes. At a huge and beautifully polished walnut desk sat Noel Ashbridge, B.Sc., Overlord of the British Kilowatts. "Fire away, then," he said; and from the depths of an easy chair beside that great desk, I fired.

Excerpts from Cinema Films

"Recently," I said, "the B.B.C. gave us some excerpts from new cinema films; I believe the transmission came direct from the sound-track of the film, running through a sound-head at the Shepherds Bush film studios, connected to Broadcasting House by land-line?"

The Chief nodded. I went on: "The very excellent quality of speech and music impressed me, and I want to know whether you have considered the use of film for recording purposes in connection with radio."

"We certainly have the possibility in mind," said Mr. Ashbridge. "At present there is no good reason to use film recording instead of the Blattnerphone and wax-disc methods. But it may come.

"There are two main purposes for which we record programmes. First, for retransmission to the Empire. The Blattnerphone is generally used. After the steel tape has been run through for the Empire transmissions we 'wipe off' the programme, and the tape is clean and ready for another recording. So the Blattner tapes can be used over and over again. This couldn't be done with film—it would just go on the scrap heap. Which would be expensive.

"It is true that sound-film *can* give superior quality to Blattnerphone; although, mark this, the Blattner recording has been enormously improved and can be very good indeed nowadays, but when we are especially keen on a very high quality recording we use wax discs.

"The second main purpose of recording is for 'archives'; programmes are kept in our record library for future use by the programme departments (in retrospective end-of-the-year shows, for instance), and important recordings are also stored for posterity. For these we use wax. Blattner tape is expensive, and we could not afford to lock miles of it away."

"Why not use film?" I asked.

"Think of the future. In perhaps twenty years time the present film technique may have vanished; the reproducing apparatus will probably be entirely changed. But the reproduction of wax records is so simple—a turntable and a pick-up; even if the disc has gone out of fashion in twenty years they will be able to knock up a turntable and use a pick-up when they put on a 1933 record.

"The disc record is, of course, very limited in the length of the programme you can record on one side—that is a point in favour of film, although our gramophone operators here are remarkably clever in fading without a break from the end of one record to the beginning of the next side, by means of twin turntables, as you may have noticed when we broadcast complete operas."

Noel Ashbridge, the "chief" of B.B.C. engineering activities

An operator in the gramophone effects studio at Broadcasting House. He follows the script and "mixes" the effects for different records

Comparing quality of musical reproduction, and absence of background noise, the "Chief's" opinion was that film and wax are practically at a dead-heat. Both are ahead of Blattnerphone, though not by a big margin when the latest Blattnerphone machines are used. The B.B.C.'s faith in the Blattner is indicated by the fact that three new recording machines are about to be installed at Broadcasting House, making five in all.

For rapidity of recording, on urgent jobs, the Blattner wins hands down. Film would have to be developed after the original "take" before they could be played-back. Wax discs have to be pressed in moulds made from the original soft-wax "master."

The B.B.C. is interested in a new method of disc recording as rapid as the Blattner, however.

Investigating a New Process

"My research engineers are at present investigating the new processes of 'direct recording'," said Mr. Ashbridge. "The idea is that the sound-groove is cut directly on the disc which you afterwards use to reproduce the music. There are several types of disc, some metal, some of a composition.

"You see, we constantly have all methods under review. In spite of what I have said, I am not writing off the film method by any means. We might use it for extremely high-quality recording."

Then we went on to talk of other things . . . of the splendid progress they are making with the constructional work at Droitwich, of the designs for North Ireland Regional (which are now finished), and other sweeping changes in 1934.

He explained how the power of the Regional transmitters will be increased from 50 to 70 kilowatts when Droitwich opens. Each of the transmitters is capable of giving 70 kilowatts, and perhaps a very little more; at present they are working well below the "flat out" point. But to put 20 more kilowatts into the aerial a great many more kilowatts *input* power to the transmitters will be needed. That will be easily arranged.

1934 Ether Searcher

Full constructional details are given here for the baseboard version of this year's Ether Searcher. It is a very simple set to build and wire up, with all the components on the top of the baseboard except the aerial volume control

GETTING right down to brass tacks has always been the aim of the designers of Ether Searchers. Knowing that they are producing *sets that set a standard* they don't have to waste words trying to "sell" their sets. Ether Searchers, by obvious merit, sell themselves.

So we can begin right away with the constructional details of Ether Searcher 1934 version. First thing to note, *if you haven't already done so by looking at the fine display of pictures in the centre pages*, is that there are two Ether Searchers.

Both make use of an identical theoretical circuit, which, by the way, S. Rutherford Wilkins explains on page 75. These two practical interpretations of the fundamental Ether Searcher circuit help solve a problem that every set designer is up against. The problem, that is, of keeping up with the trend of commercial design, and at the same time keeping the general layout and construction simple.

The set for the ordinary amateur is still the simple baseboard arrangement, with all the components in one place—making a simple blueprint possible, and certainly providing a very straightforward wiring sequence that can be seen at a glance without the complication of sub-baseboard wiring.

Still, on the other hand, there are many amateurs who can quite well tackle the modern chassis construction, and who, indeed, insist upon this type of layout in the interests of appearance and modernity.

Well, we thought a great deal about this problem, and decided to give you best of two worlds. The Ether Searcher in its 1934 version is, therefore, likely to have a very wide constructional appeal, because with its fundamentally sound theoretical circuit and alternative practical layouts, it has something to offer to every reader of the paper.

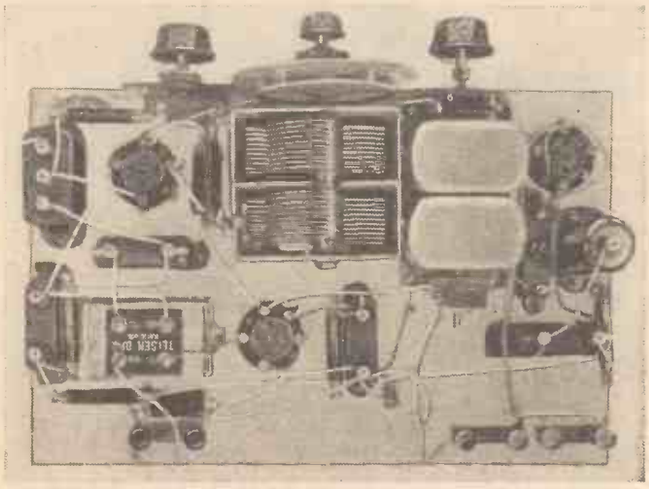
Seeing the two sets you may at first sight imagine that both the layouts are chassis construction. This is excusable, because of course we have to visualise both types of layout as being suitable for one cabinet. The relative positions of the control knobs are the same in both sets, though the actual positions of the subsidiary controls are not identical.

Cabinet for the 1934 Ether Searcher. It is a table-console model, with room for the batteries and loud-speaker

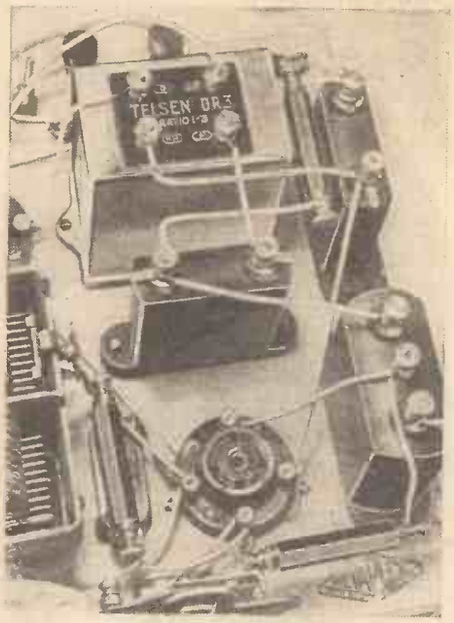
In the baseboard layout, as we are calling it, everything is in the one plane except the aerial condenser acting as volume control. *This is the only control mounted below the main baseboard*, which is supported by two battens just to keep this condenser clear and to bring the controls up to a suitable position in the front of the cabinet.

Most of the parts used in this baseboard layout are perfectly simple ones, and cheap, too, as you will appreciate from the complete list. We think the best idea is to concentrate on the description of the baseboard model this week and to go into the chassis model next week.

You will find a full-size blueprint of the model we are talking about on the inside covers. If you would prefer a separate blueprint you can obtain one from our Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, E.C.4. The price is 1s., post paid.



Plan view of the baseboard of the set showing the essentially straightforward layout of the components. Only the aerial volume control is sub-baseboard mounted



View of an important part of the set—the output stage of the 1934 Ether Searcher

For those who are going in for the chassis model, which certainly does look a neat little job, we are preparing a more complicated blueprint, which again will be printed on the inside covers as well as being available in separate blueprint form.

Taking a quick glance over the baseboard layout, for the simpler model now being described, you will see that although the components are grouped quite closely together, there is ample room between them.

The main component is the two-gang condenser at the centre of things, with the equally important coil unit to its left—looking from the control front. This tuning arrangement is very compact, considering how selective it is in the actual set.

You should note that the coil switching is brought out to a knob at the front, and this knob works not only the wave-changing but also the filament on-off switching and the gramophone pick-up switching.

Another specially interesting component is the new Lissen by-pass unit, which you will see is mounted on the extreme right-hand end of the front of the baseboard. This natty gadget consists of two condensers and a high-frequency choke mounted inside a moulded case, with three terminals on the top for connections.

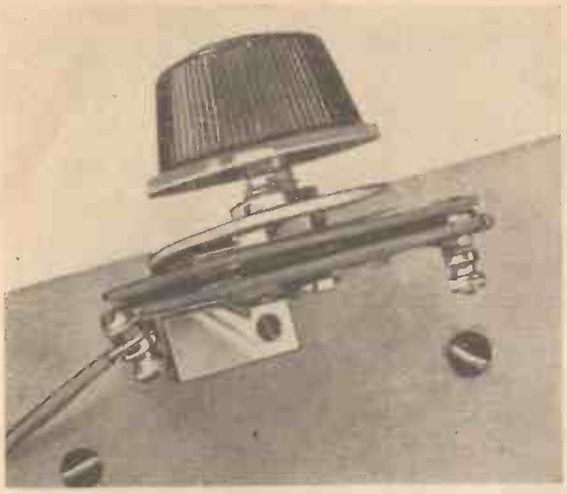
We offer you a real novelty in set design—a fundamentally sound circuit with two distinct constructional layouts. One is a simple baseboard layout, the other a fine-looking chassis job. Take your choice!

Apart from this the components are perfectly standard and you should have not the slightest difficulty in obtaining them from your dealer.

Now let us get right down to a sequence of building. We may just as well give you a record of how we ourselves actually assembled the set in our workshop.

We first got together the components. *All* of them, mind. You have an advantage, in a way, because from now on you can look at the blueprint of the completed job, just to make sure you are fixing things in their right places.

Then we placed before us the metallised baseboard. This specially treated piece of wood—known as Metaplex—is impregnated on the top surface with a highly conductive metal spray, which gives us the effect of a screened baseboard—or a baseboard with a layer of metal foil.



How the volume control is fixed by means of a special metal bracket, which is mounted on the baseboard

At the beginning you should leave off those two battens that clear the volume-control condenser. It will be easier to fix everything else first. You might as well do as we did and fix the two-gang condenser first. This is done with three bolts, which are screwed up from the underside.

Next, the coil unit. This you will find is already supplied with short lengths of coloured wire already connected to the various soldering tags. Anything to save you trouble, of course!

Note that there is an extra wire on the No. 1 tag of the G10 grid coil, this being necessary for the connections shown by the blueprint.

Here is a set that will set the standard for three-valvers of 1934. A set that makes use of the latest technical developments in the simplest possible way. Screen-grid, detector, and pentode!

Then again, note that the two No. 5 tags are joined together. Best thing is to connect the No. 5 lead from G10 coil to G3 coil and then take the No. 5 lead from G3 coil out to the set.

Make these connections *before* you attempt to screw the coil unit in place. Also poke out the connecting wires through their appropriate slots in the base—otherwise you will have to undo something when you come to the job of wiring.

The next step might as well be the fixing of the valve holders. Then you can get along to the two small fixed condensers, the pre-set coupling condenser, the 1-microfarad and .25-microfarad fixed condensers, the high-frequency choke, the by-pass unit and, lastly, the three terminal blocks for the aerial and earth, the loud-speaker and the pick-up.

Having thus broken the back of the component assembly you can fix up the bracket holding the reaction condenser in place. Here you must carefully hack away the metallised part of the wood *because no part of this condenser is at earth potential.*

If you simply connected the bracket to the baseboard without any preliminary scraping the moving plates would be automatically earthed, as the bracket would give a direct contact between the spindle and the earth terminal of the set, to which, of course, various parts of the metallised surface are ultimately connected.

Now, after all this, you can mount the two battens or runners supporting the main baseboard. This job can be done with long gimp pins or, better still, with narrow-gauge screws to make a firm fixing.

You can now conveniently mount the aerial condenser underneath. This condenser bracket is mounted on plain wood and there is therefore no preliminary scraping away to be done. Mind, though, when you screw the backet in position, that the fixing screws do not project through to the top surface of the baseboard, *otherwise they will earth the condenser.*

By this time you will find your Ether Searcher taking shape, and when you have made quite sure that everything is really well fixed you can begin to think about the wiring. This is really a perfectly simple job if you go the right way about it.

Study the blueprint very carefully. Note that every wire is numbered. Wire up in the numbered sequence, crossing off each wire on the blueprint as you actually make it in your own set. Then nothing can go wrong—no wires can be put in that should not be there and no wires can be left out.

We use No. 20-gauge tinned-copper wire and 1- or 1½-mm. insulated sleeving over each lead.

The start of the wiring—that is No. 1 lead—is the joining of those two No. 5 tags on the coils. So you are already on your way, you see. No. 2 wire goes from the coil to one terminal of the 1-microfarad fixed condenser. And so on through the sequence.

When you see a star mark against a terminal connection you will know that that connection goes to earth. Thus, the No. 4 wire goes from the filament terminal of the valve holder on to the metallised baseboard, and so to earth.

Consider all points taken to the metallised baseboard as being taken direct to earth, since the surface is connected to the actual earth terminal of the set.

The various fixed resistances are held in position by their connecting leads. Wires No. 40 and 41, for example, support a 500-ohm resistance between reaction and anode of detector valve.

Wire No. 45 is part of the pick-up connection. It is of the shielded type to prevent interaction and whistling when working on the gramophone side of the set. The outer covering is earthed by a short wire, No. 46, going to the earth terminal.

The No. 48 wire is a flexible lead from the pre-set terminal to the terminal on the top of the screen-grid valve.

The battery flexes start with the No. 53. These connections for the high-tension, low-tension and grid-bias batteries are made direct to the various component terminals. You should note that we have fitted the grid-bias battery at the back of the set to reduce the length of the wires and to make for general neatness.

Close-up of the coil unit used in the 1934 Ether Searcher, with its combination switch knob for wave-changing, on-off and gramophone pick-up functions

When the set has been completely wired up according to the blueprint you can test it out with the specified valves. Then, having satisfied

Differential aerial volume control. Adjustable inter-stage selectivity. Modified reaction system for smooth control. One-knob tuning. Iron-core coils. Combination switching. Gramophone pick-up.

yourself that all is in order—as it should certainly be if you have followed our instructions—you can insert the set in the table console cabinet.

This is arranged to take the set baseboard at the bottom, with the batteries on a shelf above. At the front above the set is a moving coil loud-speaker—a Microlode moving-coil with self-matching transformer.

The combination-switch control switches off the filament current and hence the set, but as this knob is clearly engraved you will have no difficulty there. As you turn a quarter in a clockwise direction the medium waves are brought in, another quarter and the long waves are in, and finally another quarter turn gives you the gramophone pick-up—that is to say the set is switched so that the detector valve receives negative bias from the grid-bias battery and acts as the first amplifying stage of the gramophone amplifier function of the set.

So much for the baseboard model. The chassis model makes a very good-looking job, as we shall explain more fully in due course. You will find that only the gang condenser,

Back view of the cabinet, showing the positions of the set, the loud-speaker and the batteries

high-frequency choke and pre-set condenser are above the chassis, the coil unit being mounted on the underside immediately beneath the gang condenser.

Both these Ether Searcher models are quite easy to operate. The pre-set condenser gives you the ability to vary the coupling between the high-frequency and detector valves to suit your locality's selectivity and volume needs. Then it is perfectly straightforward, the tuning being done on the centre knob.

For the best results you should keep the aerial differential condenser or volume control fairly low and make up the strength on the reaction. Remember that the reaction is very smooth and make use of it as we intend you to. If you play off the reaction against the volume control you will get quite amazing selectivity.

COMPONENTS NEEDED FOR THE 1934 ETHER SEARCHER

BASEBOARD MODEL

BASEBOARD
1—Peto-Scott Metaplex, 14 in. by 9 in., with two runners 9 in. by 3½ in.

CHOKE, HIGH-FREQUENCY
1—British Radiogram screened, type No. 42 (or Telsen, Bulgin).

COILS
1—Set Colvern screened iron-core, types G3 and G10, on base with on-off and pick-up switches.

CONDENSERS, FIXED
1—Dubilier .0002-microfarad, type 670 (or Graham Farish, Lissen, Telsen, T.C.C.).
1—Dubilier .01-microfarad, type 670 (or Graham Farish, Lissen, Telsen, T.C.C.).
2—Lissen .25-microfarad (or Graham Farish, Dubilier, Telsen, T.C.C.).
2—Lissen 1-microfarad (or Graham Farish, Dubilier, Telsen, T.C.C.).

CONDENSERS, VARIABLE
1—J.B. two-gang .0005-microfarad, type Unitune (or British Radiogram, Utility).
1—Graham Farish .0005-microfarad, type differential (or Telsen, Utility).
1—Lissen .0005-microfarad, type reaction (or Graham Farish, Telsen).
1—Sovereign .0003-microfarad, type pre-set (or Lissen, British Radiogram).

HOLDERS, VALVE
2—Graham Farish four-pin (or Lissen, Telsen).
1—Graham Farish five-pin (or Lissen, Telsen).

MISCELLANEOUS
1—Lissen high-frequency by-pass unit, type LN5393.

PLUGS, TERMINALS, ETC.
5—Belling Lee wander plugs, marked: H.T.—, H.T.+, G.B.—1, G.B.—2, G.B.+ (or Clix, Eelex).
2—Belling Lee spade terminals, marked: L.T.—, L.T.+ (or Clix, Eelex).
3—Telsen terminal blocks (or Lissen).

Suitable Valves

Make	Screen-grid High-frequency	Detector	Output
Mullard* ...	PM12A*	PM1HL*	PM22A*
Cossor ...	220SG	210HL	220HPT
Osram ...	S24	HL2	PT2
Mazda ...	S215B	HL2	Pen220
Marconi ...	S24	HL2	PT2
Lissen ...	SG215	HL2	PT225
Tungsram ...	S210	LD210	PP220
Hivac ...	SG210	H210	Y220
Six Sixty ...	218SG	210HL	220Pen
Triotron ...	S207	WD2	P215

*Valves used during AMATEUR WIRELESS tests.

RESISTANCES, FIXED
2—Graham Farish 500-ohm, type 1½-watt (or Lissen, Telsen).
1—Graham Farish 20,000-ohm, type 1½-watt (or Lissen, Telsen).
1—Graham Farish 40,000-ohm, type 1½-watt (or Lissen, Telsen).
1—Graham Farish 50,000-ohm, type 1½-watt (or Lissen, Telsen).
1—Graham Farish 2-megohm, type 1½-watt (or Lissen, Telsen).

SUNDRIES
Connecting wire and sleeving (Peto-Scott).
2— British Radiogram 2-in. metal mounting brackets.
1 ft. screened sleeving (Peto-Scott).

TRANSFORMER, LOW-FREQUENCY
1—Telsen, type DR3 (or British Radiogram, type ES).

ACCESSORIES

BATTERIES
1—Lissen 120-volt high-tension (or Drydex, Ever-Ready).
1—Lissen 9-volt grid-bias (or Drydex, Ever-Ready).
1—Lissen 2-volt accumulator (or Exide, Ever-Ready).

BATTERY CORD
1—Bulgin four-way battery cord.

CABINET
1—Peto-Scott, type 1934 Ether Searcher Consolette.

LOUD-SPEAKER
1—W.B., type PM4A Microlode (or Amplion, Blue Spot, R. and A., Celestion).

COMPONENTS NEEDED FOR THE CHASSIS MODEL EXACTLY THE SAME AS ABOVE, WITH THE EXCEPTION OF:

CHASSIS
1—Peto-Scott Metaplex, 12 in. by 9 in. by 3½ in.

HOLDERS, VALVE
2—Clix four-pin, type chassis-mounting.
1—Clix five-pin, type chassis-mounting.

TERMINAL STRIPS
1—Clix chassis-mounting, marked: A1, A2, E.
1—Clix chassis-mounting, marked: Pick-up, L.S.—, L.S.+.

ACCESSORIES FOR RADIOGRAM

CABINET
1—Osborn, type 259, in walnut.

GRAMOPHONE MOTOR
1—Garrard clockwork, type 11B.

NEEDLE CUP
1—Bulgin Duplex, type NC1.

PICK-UP
1—Lissen needle-armature, type LN573 (or B.T.H., Cosmocord).

VOLUME CONTROL
1—Bulgin 50,000-ohm, type VC36 (or British Radiophone).

How I Designed the 1934 Ether Searcher

By S. Rutherford Wilkin

IN designing the 1934 Ether Searcher my foremost consideration has been to provide a set to satisfy the needs of the "average" constructor. Consequently, the design is very simple and singularly devoid of "frills." Moreover, price has been a very great consideration and the set that we are presenting to you is decidedly cheaper than any of its forerunners.

Efficiency not Sacrificed

However, by careful layout and choice of components, efficiency has not been sacrificed and, despite its obvious simplicity, the Ether Searcher gives an excellent account of itself, even under the most trying conditions.

The selectivity is almost uncanny for a set with only two tuned circuits. This is primarily due to the fact that very efficient iron-cored tuning coils are used. In order to reduce loading on these coils, the inputs from the aerial and screening grid anode are tapped well down their respective coils. This loading is still further reduced by means of small variable condensers.

The .0003-microfarad preset in the screen-grid anode circuit is the coupling condenser in the tuned-grid circuit. This should not be continuously varied, but should be preset to give the best compromise between sensitivity and selectivity compatible with local conditions.

The variable condenser in the aerial lead has a slightly more complicated function. As the capacity of this is lessened the aerial loading is decreased, with a consequent improvement in selectivity. As this also reduces the aerial coupling it acts as an excellent volume control, and by means of this simple arrangement the volume can be reduced to zero even from a powerful local station.

The maximum aerial coupling, and hence maximum volume, is determined by the value of this condenser when its vanes are fully enmeshed. A value of .0005-microfarad was found most suitable.

Maximum coupling should only be used when listening to a weak foreigner well separated from the local, as with the aerial input control at maximum the set is in a condition of least selectivity.

If a straightforward variable condenser were used in this position, variation of its capacity would result in detuning of the aerial circuit. This would upset the matching of the two ganged tuning circuits. In order to obviate this difficulty, a differential condenser is used.

This is so connected that the capacity between the aerial and earth is increased at the same time as the aerial coupling is lessened. This has the effect of keeping the total load on the tuning circuit constant whatever the degree of aerial coupling.

As a volume control of this description reduces the input to the screen-grid valve on a powerful signal, it obviates the necessity for a variable-mu high-frequency valve.

In the 1934 Ether Searcher a straightforward screen-grid valve has been used. This decreases the cost of the components and improves the simplicity of the set. It will enable constructors who have a screen-grid valve on their shelves to use this in their set.

Radio-gramophone Switch

The detector-grid circuit needs little explanation. Straightforward grid-leak rectification has been employed with conventional values for the grid leak and condenser. By means of the radio-gramophone switch (which, incidentally, is combined with the wave-change and on-off switch), a pick-up can be introduced into the grid circuit of this valve, which is then automatically biased to act as a low-frequency amplifier.

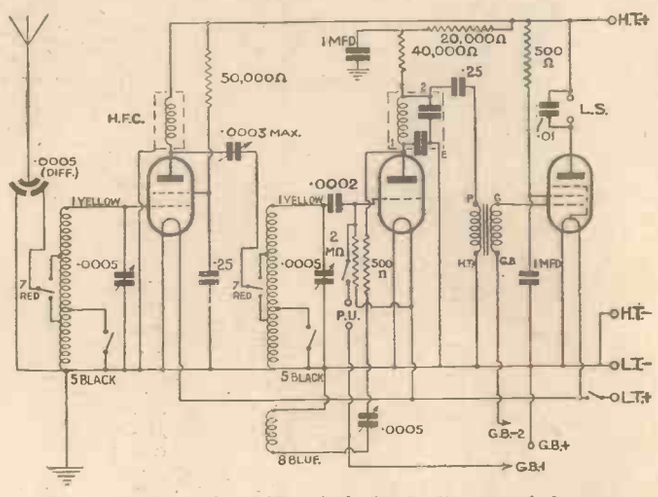
The anode circuit of the detector valve is a little unusual, as special precautions have been taken to ensure a smooth control of reaction.

It will be noticed that the reaction circuit is loaded by means of a 500-ohm resistance. This is very helpful when iron-cored coils are used, as it enables reaction to be taken much further before the condition of oscillation is introduced. The high-frequency by-pass unit also helps in this direction as it ensures that all unwanted high-frequency is efficiently by-passed to earth.

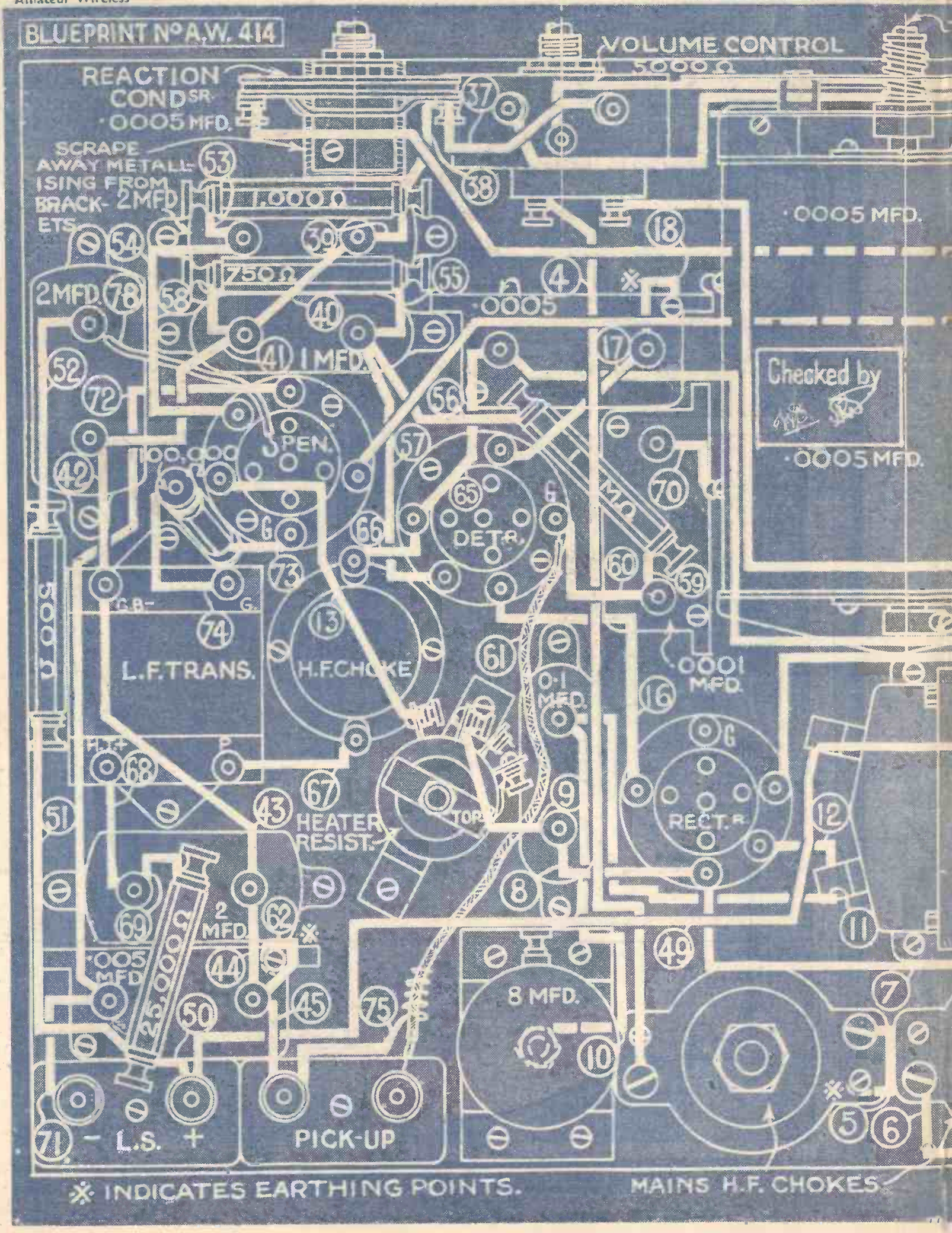
The low-frequency coupling is by the parallel-feed transformer method.

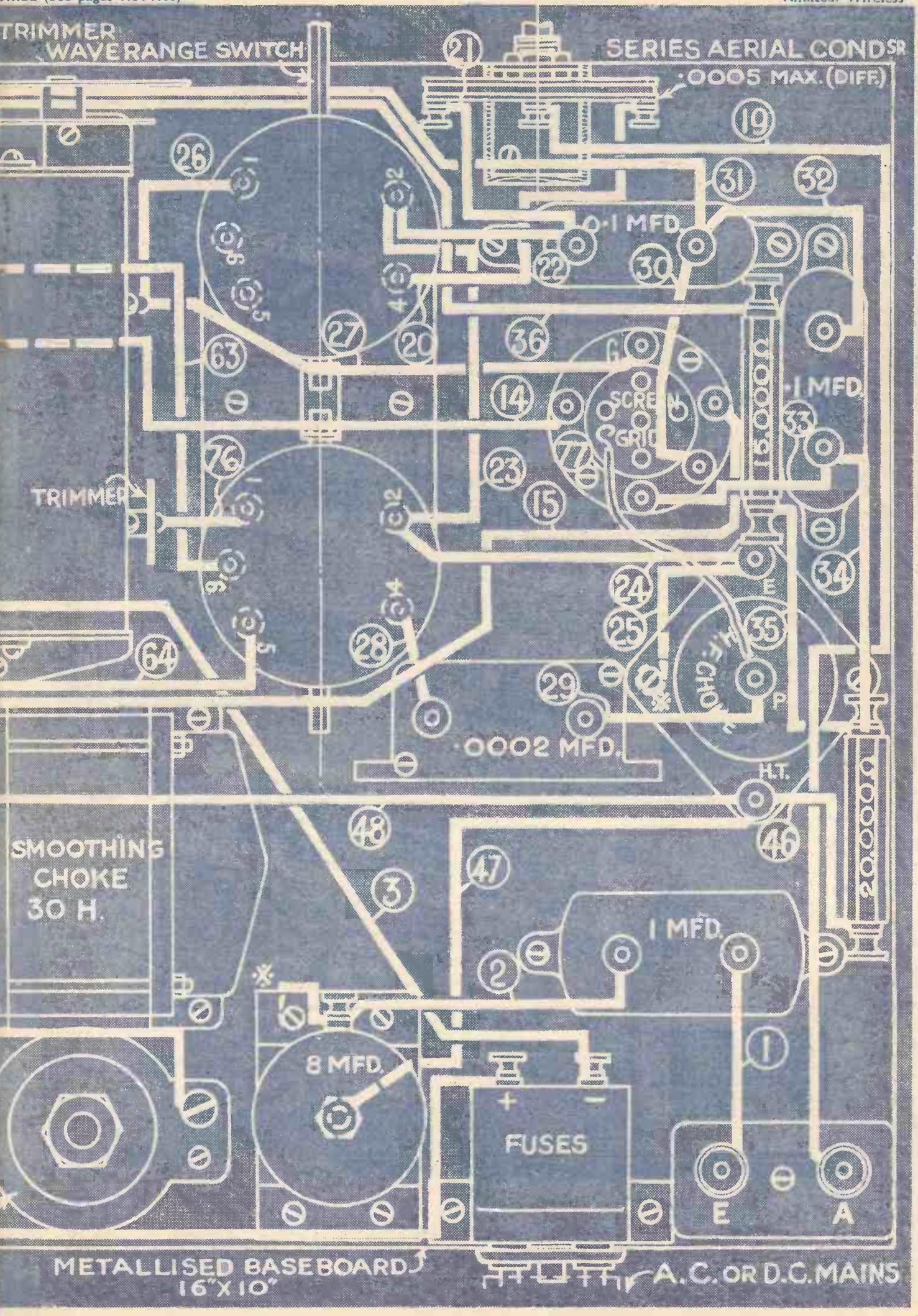
A 40,000-ohm anode resistance is used and a .1-microfarad coupling condenser; with these values the detector valve will give a good amplification at all frequencies.

The output valve used is a high-sensitivity pentode with its auxiliary grid fed with high tension through a 500-ohm resistance, which is decoupled by means of a 1-microfarad condenser to earth. In order to prevent high-note accentuation, a .01-microfarad condenser is connected across the loud-speaker terminals.

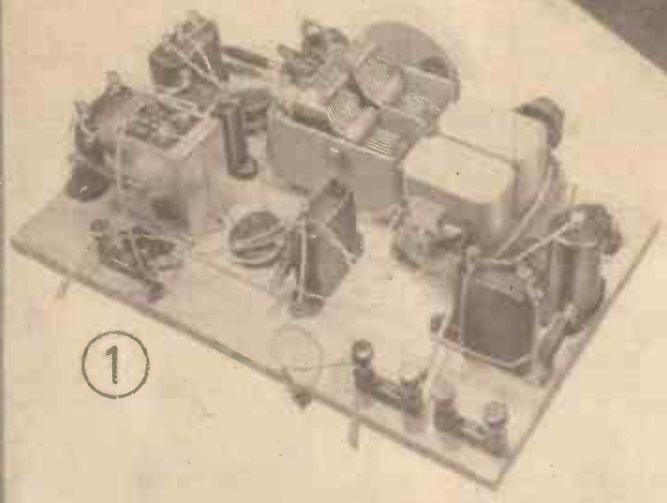


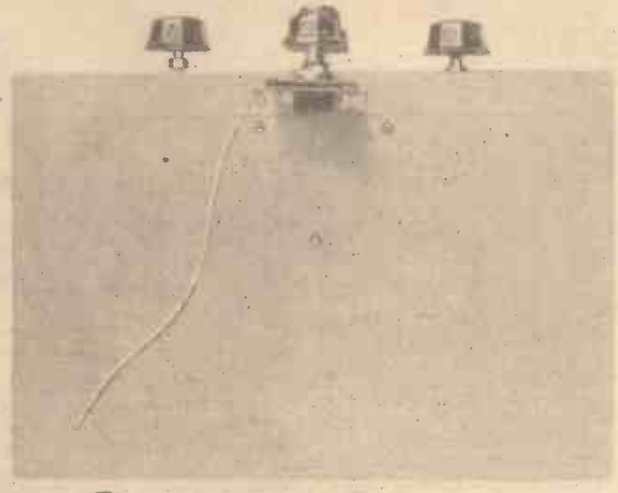
This is the complete theoretical circuit diagram of the 1934 Ether Searcher, which consists of an ordinary screen-grid stage, detector and pentode output. There are many important circuit improvements incorporated

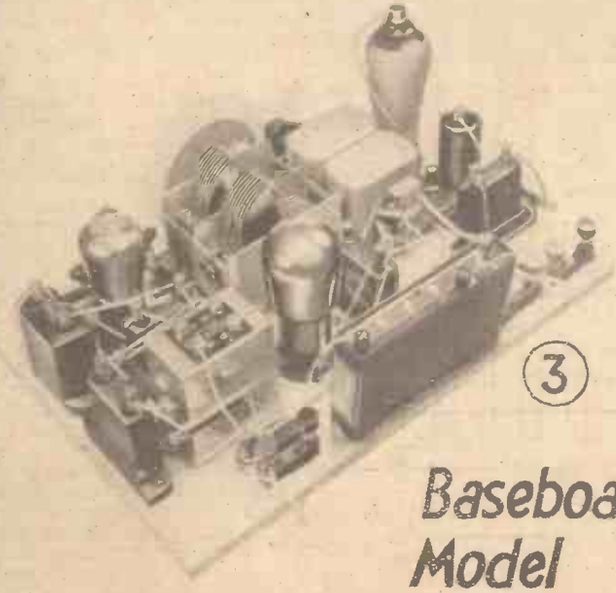

BLUEPRINT Nº A.W. 414
VOLUME CONTROL
500000
REACTION COND.SR. ·0005 MFD.
SCRAPE AWAY METALLISING FROM BRACKETS
2MFD
·0005 MFD.
2MFD
·0005
1 MFD.
Checked by
·0005 MFD.
OPEN.
100,000
DET.R.
M.P.
C.B.-
L.F.TRANS.
H.F.CHOKE
·0001 MFD.
0·1 MFD.
H.T.+
HEATER RESIST.
TOP
REC.T.R.
2 MFD
·005 MFD
25,000
8 MFD.
- L.S. +
PICK-UP
INDICATES EARTHING POINTS.
MAINS H.F. CHOKES

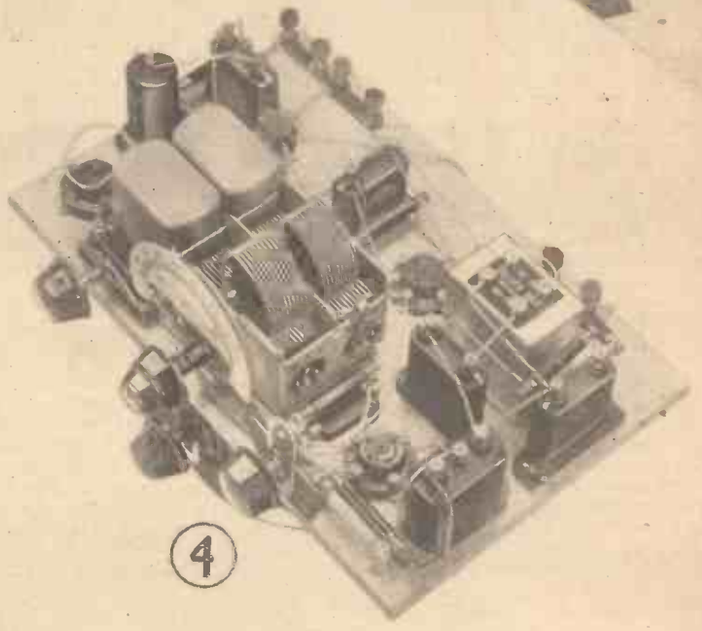

TRIMMER
WAVE RANGE SWITCH
SERIES AERIAL CONDSR
·0005 MAX. (DIFF.)
·1 MFD.
·1 MFD.
TRIMMER
SCREEN GRID
·0002 MFD.
H.T.
SMOOTHING CHOKE 30 H.
1 MFD.
8 MFD.
FUSES
E
A
METALLISED BASEBOARD 16"X10"
A.C. OR D.C. MAINS

1934 ETHER









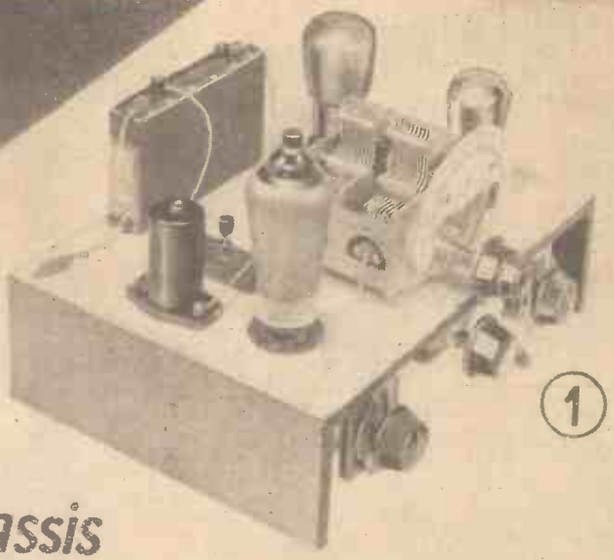
Baseboard Model

Features of the Baseboard Model

We show on the left-hand side of this pictorial guide four views of the baseboard model of the 1934 Ether Searcher. (1) How the back of the set looks with all the components in position. Note the three terminal strips at the back. (2) Underneath the baseboard is fitted a bracket holding the aerial volume-control condenser. This is the only sub-baseboard component. (3) This back view shows how the grid-bias battery is fitted on the baseboard to shorten the grid-bias leads. (4) Another general view of the completed job, showing very clearly the special by-pass condenser and choke unit at the extreme right-hand end of the baseboard.

As you will appreciate, this model is really a baseboard set, with battens added at the ends to give clearance for the aerial volume control mounted beneath. We specially recommend this set for beginners, as the blueprint—given this week on the inside covers—is very easy to follow.

R SEARCHER



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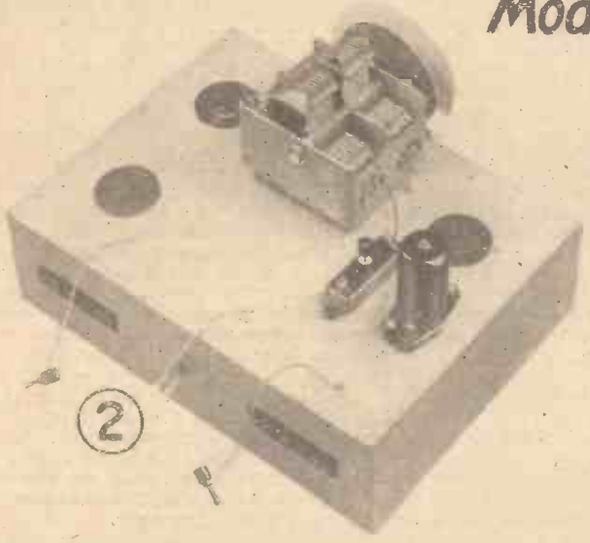
Chassis Model



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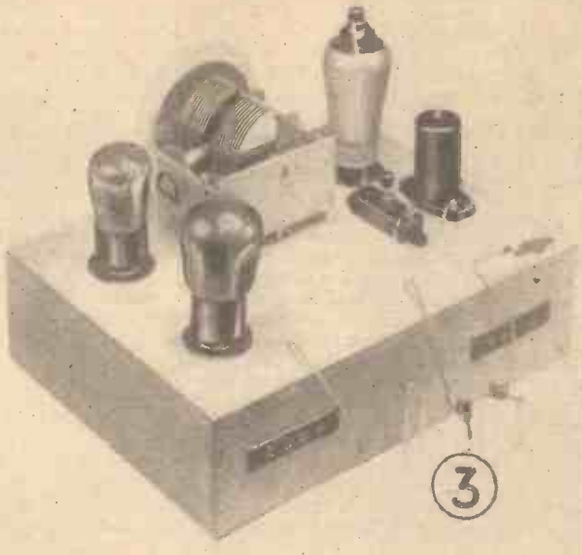

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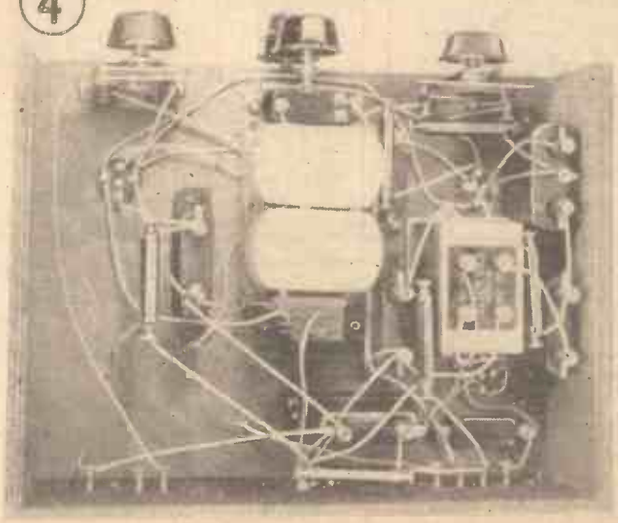
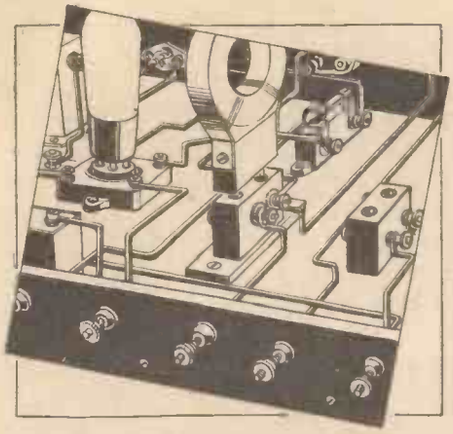


Features of the Chassis Version

Here on the right-hand side of the pictorial guide we show you four typical views of the chassis model of the 1934 Ether Searcher. This is a set we specially commend to the attention of the more advanced amateur. (1) As you will see from this view, the top part of the chassis has a clean appearance, most of the components being underneath. (2) An early stage in the construction of the chassis. Note the chassis-mounting valve-holders and the use of chassis strips instead of terminal blocks. (3) Apart from the valves the only components actually on the top of the chassis are the two-gang condenser, the high-frequency choke, and the pre-set coupling condenser. (4) The underside of the chassis contains the smaller parts, and it is here that care must be taken in the wiring. Note that the tuning coil unit comes immediately beneath the two-gang condenser, the aerial volume control being moved to one side. Full constructional details for this chassis model—and a blueprint—will be given next week.

More Practical Pointers



Typical of the early days of home construction —square, bare wires, crossing at right angles

Wiring Hints for the Amateur

By PERCY W. HARRIS, M.Inst.Rad.E.

CONSTRUCTIONAL articles usually dismiss wiring in a single sentence. Sometimes reference is made to flexible wiring, with the use of either sleeving or ready-insulated wire from which the covering has to be stripped in order to establish electrical contact. It is generally assumed that the reader knows all about it.

That this is far from being the case is clearly shown by an examination of most home-built receivers.

Many Fashions in Wiring

There have been many fashions in the wiring up of radio sets. As these receivers were not the first electrical instruments to need such wiring, it is natural that, at first, the methods used were borrowed from ordinary electrical engineering. Rubber-, cotton-, or silk-covered copper wire of the kind used for electric-bell wiring was adopted at first and later ready-tinned wire (tinning facilitates soldering) or hard-drawn copper of sufficient thickness to maintain its shape came into general use.

Wherever there was any likelihood of one wire touching another insulating sleeving was used and still later, thinner wire, covered throughout with insulated sleeving save at points of contact, came into popularity.

Ordinary electrical engineering work does not deal with high frequencies, and at first it was not realised what detrimental effects can occur when wires are bunched together. There can easily be sufficient capacity between a pair of parallel wires separated from one another by only a thin layer of insulation completely to upset the functioning of a receiver.

When this was realised, there came a vogue of sharp-angled wiring and it was soon the fashion to wire up a set almost geometrically, all crossing wires passing over one another at exact right angles, while parallel wires were kept spaced from one another as far as possible. This gave the receiver a skeletonised appearance, but, nevertheless, it avoided many of the capacity and inductive troubles which previously bothered designers.

Square-section wire — which originated in America — then became "the thing" and superior people looked askance at any set not so wired up.

The next step appeared, at first, to be a retrograde one and, again, originated in the United States. Stiff wiring, while looking very smart and efficient, is the world's worst kind of wiring for commercial sets, or, in fact, for any set which has to be transported from place to place and subjected in this way to vibration.

A commercial set gets all kinds of bangs and knocks before it reaches your home and rigid leads neatly bent at right angles, and taking comparatively long paths from one point to another in order to maintain a good appearance, are peculiarly susceptible to vibration.

Immediately quantity production of wireless receivers became the rule, very soft and flexible wire, fully insulated, returned to use. A study of the question showed that while capacity and inductive effects between wires *can* be highly detrimental, the wires in a receiver so affected are comparatively few, such leads as earth wires, filament wires, low-frequency leads and so forth being unaffected by bunching—in fact, bunching them together may actually be beneficial.

The spacing and layout of parts was carefully replanned so as to make the essential leads short, while cabling or weaving non-critical wires together in a braided sleeving enabled complete sets of wiring to be ordered from wire manufacturers and slipped into place with a minimum of effort.

In the home-constructor world, similar methods were adopted. In fact, most of the skill in laying out a receiver consists in the arrangement of parts in such a way that the essential leads are short and unaffected by detrimental influences. Remember that any leads directly connected to the grids of valves —and particularly those connected to the high-frequency and detector valves—are very sensitive to disturbing influences.

Feeding Back Energy

Remember, also, that a plate lead, if brought near to a grid lead, may give sufficient reaction effect by feeding back energy to set the whole receiver into oscillation. When you are building a set, look at the design to see where these leads come and do not be tempted to vary the author's layout.

Recently, I have come across several sets the performances of which have been quite spoiled by the builder thinking he can improve upon the author's design by adding screening in a few special places. Take, for example, the lead which goes from the top end of the tuning coil to the grid of a valve. We will assume that the coil itself and the condenser are both screened.

Metal-covered Grid Leads

In one set I recently inspected, the builder had taken some wire covered with a metallic braiding and used this as the grid lead, earthing the braiding so as to form a screen.

It so happened the set did not work properly and its owner proudly pointed out to me the care he had taken to ensure correct working, even showing me this screening as an indication that he had done actually *better* than the designer in obtaining stability. I removed this lead, substituting for it an unshielded lead, and after a little adjustment the set worked excellently.

My friend was mystified, but I pointed out to him that the shielding of this lead had added so much additional capacity to the grid circuit that he had upset the condenser ganging.

Practical Points

Having given, so to speak, a history of wiring, let us descend to a few practical points which may not be known to you. You have a choice of several methods of wiring which can be divided under the two main headings of soldered connections and screw-down connections. With either soldered or screw-down connections you have a choice of flexible ready-insulated wire, stiff ready-insulated wire, flexible bare wire with slip-on sleeving and rigid bare wire with slip-on sleeving.

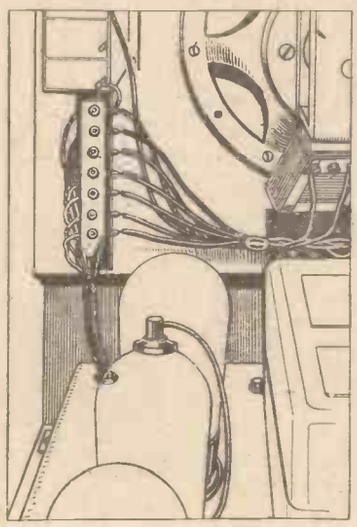
You also have a choice in all of these of either tinned or untinned wire. Let me say at once that the set will not work any better with thick wire than with thin wire unless the thin wire is much thinner than you are likely to use for wiring up a set.

No. 22-gauge tinned-copper wire is quite thick enough for any receiver, but I have known a man go to all kinds of trouble to use even No. 16 wire, thinking that by so doing he would add to efficiency. As No. 16 wire is very much thicker and has a lower resistance than No. 22 wire there might be thought to be something in the idea, but actually the resistance of any lead in a normal kind of set (I am not talking of ultra-short-wave sets at the moment) is practically negligible compared with other resistances in series with it.

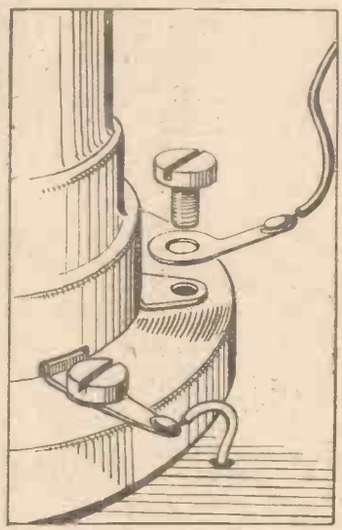
Tuning coils, for example, even of the most efficient kind, have much finer wire than No. 22 in these days and the fractional resistance introduced by the wiring-up lead can be completely ignored provided (this is a very important point) that joint contacts are properly made. A bad contact will make just as much mischief and trouble with a thick wire as with a thin one!

In practice even when the builder is highly skilled a soldered set is not much more efficient than one with screwed-

Continued on page 80

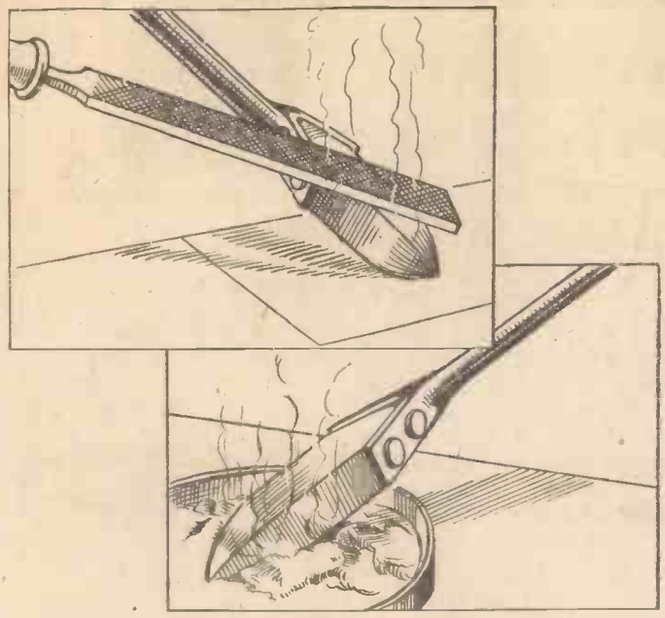


Earth wires, filament wires and low-frequency leads are unaffected by bunching, as in this example from a modern factory-produced receiver



Soldered connections are rarely made to the component—the contact between the lead and the terminal is still a screw-down one, if soldering tags are used

Wiring Hints for the Amateur—*Continued from page 78*



To tin a soldering iron quickly file the bit bright and without delay rub it in a mixture of solder and soldering flux

down connections. Clean bare wire twisted round in a neat little hook of the diameter of the shank over which it is slipped, with the nut screwed down firmly upon it, gives every bit as sound an electrical connection as any other method.

Soldered connections are rarely made to the components themselves—what usually happens is that a soldering lug is screwed underneath the terminal and the wire soldered to this lug. The contact, you will notice, between the lead and the terminal is still a screw-down one—on to the soldering lug!

Difficulties of Soldering

And if a good soldered connection is not so much superior to a screw-down connection, what about a bad one? Some people take readily to soldering and are able to make excellent joints, while others, even with the best equipment (electric irons and so forth), always seem to make a mess of it.

That terrible substance, soldering paste, has, perhaps, ruined more sets than any other accessory. Far too many set builders seem to think that it is the substitute for heat!

There is only one way to make a proper solder connection and that is to have a clean joint with a very hot and very clean bit, properly tinned and applied not too long to the soldering lug. The best soldering lugs, nowadays, are ready tinned, and if the wire itself is tinned, a small blob of solder on the end of the bit will serve to make the joint when the point of the bit is held in contact both with the wire and the lug.

How to Make a Clean Joint

If the iron is really hot and clean, and the wire as well as the lug is clean, the temperature of both will be rapidly raised and the solder will run like water on to both the end of the wire and the lug. Immediately this happens, the bit should be withdrawn and the joint cooled, preferably by touching it with a wet rag. The whole operation should not take more than a few seconds.

Contrast this with what usually happens. The user withdraws a red-hot iron from the gas stove, applies a stick of solder to it, and a spot of solder melts and rolls clean off the iron to the floor, where it splurges itself into a bright, many-rayed star. After two or three further unsuccessful attempts to get the solder to stick on the end of the bit, this latter is plunged into a frizzling mass of soldering paste and once more the solder is applied.

By this time some may stick on it, and, carefully, so as to avoid dropping this precious globule, the bit is carried to the set. A moment later the smell of burning celluloid indicates that the user has unwittingly touched the side of the tuning coil in his endeavour to get down to the contact it is desired to solder.

On reaching this important place, nothing whatever happens, except, perhaps, the globule of solder rolls off on to the baseboard, where it burns a nice little brown mark, but in most cases the iron by this time will be so cool that it will not raise the temperature sufficiently to make the solder flow on the joint.

Large gobs of soldering paste are now smeared on to the joint and at the next application of the hot iron (probably now too hot!) the paste melts, fizzles and finally is dissipated as a gummy spray on to adjacent components, a good deal of it melting and running underneath the soldering lug, maybe insulating it.

Sometimes, too, if the component is made of an inferior moulded substance, or if ebonite is a part of the structure, the shank of the terminal will get so hot as to loosen itself in its bedding and you never again succeed in properly tightening it.

Finally, drops of solder cover the joint, but it is not a real electrical connection, for the solder is simply "sitting" on the top of a layer of soldering paste and is not making electrical contact at all. When it is cold the joint can be pulled apart with the slightest effort.

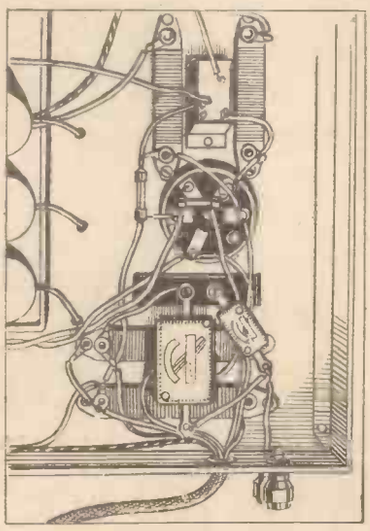
Here are a few brief instructions on soldering which, if faithfully carried out, should enable you to make a good joint. First of all see that your soldering lug is quite clean, scraping it bright, if necessary, with the point of a pocket knife. Make sure your wire is also quite clean, scraping this, too.

While the iron is heating either electrically or in a gas flame or even in the fire, have a large file ready and directly the bit is hot enough quickly file it bright. Then, without a moment's delay, tin it by rubbing it in a mixture of solder and soldering flux in a small tin lid.

If the copper bit is filed bright, the solder will run quickly over the surface, after which there is no difficulty in getting it to hold a little more solder from the stick. Still acting very quickly, transfer the tinned soldering bit to the joint and press firmly on it, holding it in such a way that the solder can run off on to the wire and the lug.

Now we come to a very important point. If the solder does not run on to the joint within three or four seconds, the bit is *not hot enough*, so withdraw it at once, otherwise all you do is to transfer heat from the bit to the wiring, the lug, the terminal shank and other parts without doing the slightest good. A very tiny touch on the end of a match of a good non-corrosive soldering paste is generally a help, but the touch must be a very small one in any case. The best of all fluxes for wireless work is a little powdered pure resin.

When this cools, it is a perfect insulator and, being completely non-corrosive, will do no harm to those parts over which it may run. Many of the soldering pastes sold, while being non-corrosive before heat has been applied, do not retain this property after they have been heated and sprayed over adjacent parts. Furthermore, some of them, after heating, are quite conducting and cause a leak.



In a modern receiver parts are arranged to make essential leads short, while the non-critical wires are run in braided sleeving in groups

Perhaps the best of all ways of soldering is to tin the lug and have a small blob of solder on it before it is screwed under the terminal, and also to tin the end of the wire separately. Then when the end of the wire is held against the blob of solder on the lug, a touch with a hot iron will cause the two to run together and make a perfect joint in a minimum of time.

Wiring up a set with soldered connections takes a lot more time and, if the builder is expert at soldering, the final result will be very pleasing to the eye and thoroughly efficient electrically. In nine cases out of ten, however, people cannot solder well and it is much better electrically, mechanically and every other way, to make neat loops in the wire and to screw them down under the terminals of the various components.

1934 ETHER SEARCHER

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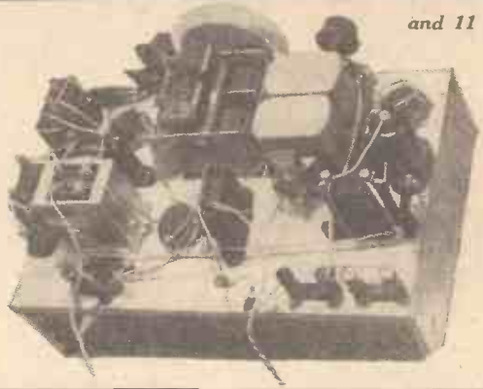

Illustration shows BASEBOARD MODEL appearing in the official BLUEPRINT.

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1 Dubilier .0002-mfd. fixed condenser, type 670		1	0
1 Dubilier .01-mfd. fixed condenser, type 670		2	0
2 Lissen .25-mfd. condensers		4	0
2 Lissen 1-mfd. condensers		5	0
1 J.B. two-gang .0005-mfd. Unitune variable condenser		17	6
1 Graham Farish .0005-mfd. differential variable condenser		2	0
1 Lissen .0003-mfd. type reaction condenser		2	6
1 Sovereign .0003-mfd. pre-set condenser		1	3
2 Graham Farish four-pin valve holders		1	0
1 Graham Farish five-pin valve holder			8
1 Lissen H.F. by-pass unit, LN5393		5	6
5 Belling-Lee wander plugs			10
2 Belling-Lee spade terminals			4
3 Telsen terminal blocks		1	6
2 Graham Farish 500-ohm fixed resistances		3	0
1 Graham Farish 20,000-ohm fixed resistance		1	6
1 Graham Farish 40,000-ohm fixed resistance		1	6
1 Graham Farish 50,000-ohm fixed resistance		1	6
1 Graham Farish 2-megohm fixed resistance		1	6
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Programme Criticisms by WHITAKER-WILSON

WITHOUT FEAR OR FAVOUR

Monday

RECEPTION has been extraordinarily good all day. I wonder whether the fog had anything to do with it? Anyhow, I wandered about in it, wirelessly speaking.

At various times of the day four of the smaller bands attracted me: the Western Studio, Haydn Heard's, Reginald King's, and Callender's.

There is no sense comparing one with another, but there may be in saying that, taking them as typical of our lighter entertainments in the fill-up hours, they hold their own with much we hear from abroad.

◆ ◆ ◆

The London atmosphere of Elgar's "Cockaigne Overture" always attracts several people of my acquaintance. There was a singularly good performance of it to-night in the first of the six concerts devoted to British music.

Roger Quilter's Serenade, "I Arise from Dreams of Thee," rather took my fancy, which is really another way of saying I admired Eric Greene's way of singing it. Singer and song seemed to agree. That is necessary for real artistry, which this was.

Mr. Morris's symphony may or may not have been considered a good performance by those who took part in it. I don't know what Dr. Boult's verdict was. To me so much of it sounded dull—I say this quite dispassionately—that I hope it sounded better in the hall than on the air.

The touch of the master hand showed up in *The Song of the High Hills*—but then, Delius is Delius. I like that work better every time I hear it. A very good performance, by the chorus especially.

◆ ◆ ◆

After a few moments (to let the effect of Delius fade) I switched in as a latecomer to *Meet the Prince*. An entertaining show. I cannot say I picked up the story very well, but well enough to convince me there *was* a story. Nice music, too. Lyrics a bit wishy-washy, perhaps, but quite passable. I seem to have spent a good deal of time listening to-day!

Tuesday

Nora Grühn's voice pleases me. She takes the trouble to keep her tone nice and velvety. If all sopranos paid as much attention to tone as she does, we should be spared much that makes for poor broadcasting. We might hear more of Miss Grühn.

The other two in the recital to-night were Antoni Sala (cello) and Isabel Gray (piano). I did not hear very much of Mr. Sala, but I liked what I did hear. Miss Gray's playing of Scarlatti and Moszkovski gave me pleasure. I shall listen for her again.

Wednesday

Dame Ethel Smythe's celebration concert must have been a pleasant experience for her. She was enthusiastically received. Her work, *The Prison*, appealed to me very much in places. Some of it surprised me, so virile did it seem.

Elsie Suddaby and Stuart Robertson seemed to extract every ounce of effect out of their parts, but that was probably due in some measure to Sir Thomas Beecham's conducting. If there is anything in a work he will find it.

Thursday

Having had the honour of being allowed to *Meet the Prince*, I arrived home in time to *Meet Mrs. Beeton*. I sincerely congratulate Mr. du Garde Peach on his amusing writing. Just ridiculous enough not to be ridiculous.

As Mr. Peach is so versatile, he had better let us *Meet Mr. Bradshaw* and write a time-table comedy. Most time-tables are comic, after all. Perhaps he will take the hint?

◆ ◆ ◆

The most attractive broadcast of the week thus far was *Vienna*, the pot-pourri of music by Johann Strauss and Joseph Lanner. I imagine I am reflecting the opinion of all of you by saying that.

I never heard the Theatre Orchestra play better. There was a good reason. Dr. Julius Bürger is not only a brilliant conductor, but understands Viennese music in a way we do not understand it over here. This broadcast can be taken as authoritative so far as real Hungarian style goes. Easily one of the best things the B.B.C. has done for a twelvemonth.

This form of entertainment should be repeated. It has been very successful both in Germany and Austria. I should be sorry to see—or, rather, to hear—the Continental method of broadcasting copied as a whole, but this section of it might be taken as an example of what is good, satisfying light entertainment.

Incidentally, how well the Wireless Chorus sang! Also it would be wrong of me not to say a word for Ann Lawrence, Nora Grühn, and John Hendrik, all of whom entered thoroughly into the spirit of the thing. That is what we want—*real atmosphere*. We got it to-night.

Saturday

I had made up my mind I would settle down to a good evening's listening when the telephone bell went and I was bidden to Broadcasting House in order to take part in the *In Town To-night* transmission.

I managed to listen there by going into a room adjoining the studio. The spontaneous touch of this *In Town To-night* style seemed to me fortunately exemplified in the simple little talk by the Mayor of Ramsgate and young Eddie, of cinema fame. The more topical these things are the better.

Gillie Potter was in good form. He amused me intensely. I beg his pardon. I forgot. He likes to be called Mr. Gillie Potter. He corrected the announcer to that effect. Quite right, too. A man has his dignity to keep up.

Didn't you like Leslie Sarony's little classic? How did it go? I think I can repeat its rhythm by the use of italics. "*Coom*, pretty one, *Coom* pretty one, *Coom*, coom, coom, *coom*!" I loved it. Great boy, Leslie.

What interested me as much as anything in this show was the dialogue between Eric Maschwitz and Dr. Julius Bürger.

I am sure you will agree with me when I say I hope Dr. Bürger will be asked again at no distant date. He has something to teach all of us.

He speaks English remarkably well.

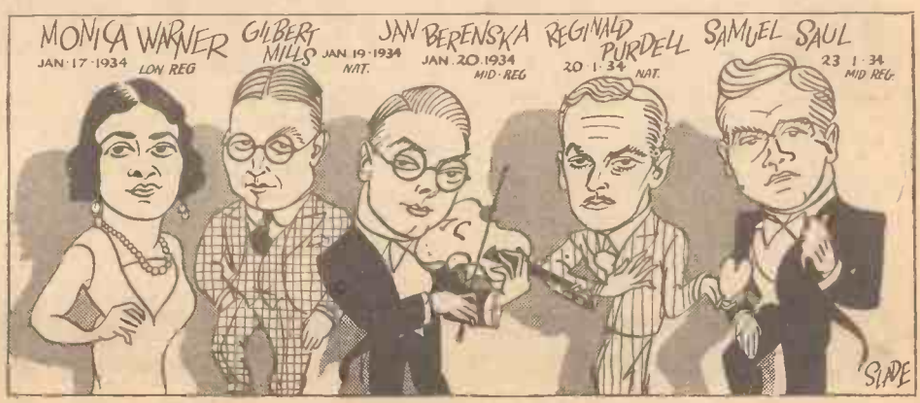
Perhaps I might add a few words about that amazing little organ I described. It was really remarkable and, I thought, sounded extraordinarily well through a loud-speaker. I had a chance of listening to it during rehearsal.

When you think of pipes made of toffee and carbide tins, a windchest of an egg box, bellows of a tea-chest and a bit of an old charabanc cover, it was something out of the ordinary. The inventor, Mr. J. Dayton (an out-of-work watchmaker) was very unassuming about it. He could not read a note of music and had to learn to play the instrument after he had built it.

I have the pleasant feeling that the opportunity the B.B.C. gave him to broadcast it will help him considerably. I sincerely hope so.

I have just been looking at my Thursday notes again. I add here that I consider Dr. Bürger proved his complete knowledge in his illustrations of how a Viennese waltz should be played.

Listen to These Broadcasters - - - - - By Slade



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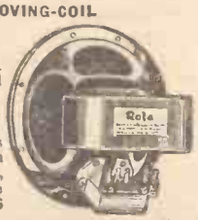

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From 200 metres upwards the wavelengths are according to the Lucerne Plan; as alterations may be expected, the list will be brought up to date week by week. For the purpose of better comparison, the power indicated is that of the carrier wave.

Metres	Kilocycles	Station and Call Sign	Country	Power (Kw.)
16.86	17,790	Daventry (GSG)...	Great Britain ...	20
16.88	17,775	Huizen (PHI)	Holland	20
19.54	15,350	Lisbon (CT1AA)...	Portugal.....	2
19.56	15,330	Schenectady(W2XAD)	United States...	20
19.68	15,234	Paris (Coloniale)...	France	15
19.73	15,200	Zeesen (DJB)	Germany	8
25.25	11,880	Paris (Coloniale)...	France	15
25.28	11,865	Daventry (GSE).....	Great Britain.....	20
25.4	11,810	Rome (2RO).....	Italy	15
25.51	11,760	Zeesen (DJD).....	Germany	8
25.53	11,750	Daventry (GSD)...	Great Britain...	20
25.57	11,730	Huizen (PHI).....	Holland	40
25.63	11,705	Paris (Coloniale)...	France	15
30.0	10,000	Madrid (EAQ).....	Spain	20
31.28	9,590	Sydney (VK2ME) ...	New SouthWales	12
31.3	9,585	Daventry (GSC) ...	Great Britain ...	20
31.38	9,560	Zeesen (DJA)	Germany	8
31.55	9,510	Daventry (GSB) ...	Great Britain ...	20
37.33	8,036	Rabat (CNR).....	Morocco	6
38.47	7,799	Radio Nations (HBP)	Switzerland	20
42.92	6,990	Oslo (LCL).....	Norway.....	.5
43.86	6,840	Budapest (HAT2) ...	Hungary.....	2
45.38	6,610	Moscow.....	U.S.S.R.....	10
46.69	6,425	Boundbrook (W3XL)	United States ...	1
48.86	6,140	Pittsburgh (W8XK)	United States ...	40
48.94	6,130	Mexico (XETE).....	Mexico	2
49.02	6,120	Wayne (W2XE) ...	United States ...	1
49.18	6,110	Chicago (W9XF) ...	United States ...	5
49.18	6,110	Boundbrook (W3XAL)	United States ...	18
49.4	6,073	Skamlebaek (OXY)	Denmark	.5
49.47	6,065	Nairobi (VQ7LO)...	Kenya Colony ...	.5
49.59	6,050	Daventry (GSA) ...	Great Britain ...	20
49.83	6,020	Zeesen (DJL).....	Germany	10
50.0	6,000	Moscow (RNE)	U.S.S.R.	20
50.26	5,969	Vatican (HVJ)	Italy	10
200	1,500	Fecamp (R. Normandie)	France	10
201.1	1,492	Bordeaux-Sud-Ouest	France	3
203.5	1,474	Plymouth	Great Britain ...	.3
203.5	1,474	Bournemouth	Great Britain ...	1
206	1,456	Common Wave.....	France	
207.3	1,447	Common Wave.....	Spain	
208.6	1,438	Common Wave ... (Myiregyhaza, Magyarovar, etc.)	Hungary.....	
209.9	1,429	Newcastle	Great Britain ...	1
209.9	1,429	Beziers	France	1.5
209.9	1,429	Radio LL, Paris	France	1.2
209.9	1,429	Cork (6CK)	Irish Free State...	1
211.3	1,420	Common Wave.....	Finland	
214	1,402	Common Wave.....	Sweden	
215.4	1,393	Radio Lyon.....	France	.7
218.2	1,375	Common Wave.....	Switzerland	
218.2	1,375	Basle	Switzerland	.5
218.2	1,375	Berne	Switzerland	.5
221.1	1,357	Common Wave.....	Italy	
221.1	1,357	Turin (2)	Italy	.2
221.1	1,357	Common Wave.....	Norway.....	
222.6	1,348	Common Wave.....	International.....	
222.6	1,348	Aberdeen	Great Britain ...	1
222.6	1,348	Vitus, Paris.....	France	1
222.6	1,348	Nice-Juan-Les-Pins	France	.5
222.6	1,348	Dublin (2)	Irish Free State...	1.2
222.6	1,348	Koenigsberg	Germany	.5
222.6	1,348	Lodz	Poland	2
222.6	1,348	Milan Vigentino (2)	Italy	7
222.6	1,348	Dornbirn	Austria	.5
224	1,339	Montpellier	France	.8
222.6	1,330	Common Wave.....	Germany	
225.6	1,330	Hanover	Germany	1.5
225.6	1,330	Bremen	Germany	1.5
225.6	1,330	Kiel	Germany	.25
225.6	1,330	Flensburg	Germany	.5
225.6	1,330	Stettin.....	Germany	.5
225.6	1,330	Magdeberg.....	Germany	.5
227.1	1,321	Budapest (2)	Hungary.....	3
228.7	1,312	Common Wave.....	Sweden	
230.2	1,303	Danzig.....	Germany	.5
231.8	1,294	Common Wave.....	Austria	
231.8	1,294	Linz	Austria	.5
231.8	1,294	Salzburg	Austria	.5
231.8	1,294	Klagenfurt	Austria	
233.5	1,285	Belgium	.....	
235.1	1,276	Common Wave.....	Norway	
236.8	1,267	Common Wave.....	Germany	
236.8	1,267	Nurnberg	Germany	.2
236.8	1,267	Kaiserslautern	Germany	1.5
236.8	1,267	Augsburg	Germany	.25
238.5	1,258	Riga	Latvia	15
238.5	1,258	San Sebastian (EAJ8)	Spain	6.6
240.2	1,249	Luxembourg (?) ...	Grand Duchy ...	200
243.7	1,231	Gleiwitz	Germany	5
245.5	1,222	Trieste	Italy	10
247.2	1,213	Lille PTT.....	France	1.4
249.2	1,204	Prague Strasnice (2)	Czechoslovakia...	3
251	1,195	Frankfurt-am-Main	Germany	17
251	1,195	Trier	Germany	2
251	1,195	Freiburg In Breislau	Germany	5
251	1,195	Cassel	Germany	.25
253.2	1,185	Kharkov (2)	U.S.S.R.....	35
255.1	1,176	Copenhagen	Denmark	.75
257.1	1,167	Monte Ceneri	Switzerland.....	15
259.1	1,158	Moravska-Ostrava...	Czechoslovakia...	11
261.1	1,149	London National ...	Great Britain ...	50
261.1	1,149	West National	Great Britain ...	50
263.2	1,140	Turin (1).....	Italy	7
265.3	1,131	Hoerby	Sweden	10
267.4	1,122	Belfast.....	N. Ireland	1
269.5	1,113	Koslce.....	Czechoslovakia...	2.5
271.7	1,104	Naples.....	Italy	1.5
274	1,095	Barcelona (EAJ1) ...	Spain	5
276.2	1,086	Falun	Sweden	.5
276.2	1,086	Zagreb	Yugoslavia.....	.75
278.6	1,077	Bordeaux PTT	France	13
280.9	1,068	Tiraspol	U.S.S.R.....	10
283.3	1,059	Bari	Italy	20
285.7	1,050	Scottish National ...	Great Britain ...	50
288.6	1,040	Leningrad (2).....	U.S.S.R.	100
288.6	1,040	Rennes PTT	France	1.3
291	1,031	Heilsberg	Germany	60
293.5	1,022	Madrid (EAJ7)	Spain	2
296.2	1,013	North National ...	Great Britain	50
298.8	1,004	Bratislava	Czechoslovakia...	14
301.5	995	Hilversum (Huizen prog.)	Holland	20
304.3	986	Genoa	Italy	10
304.3	986	Cracow	Poland	1.5
307.1	977	West Regional	Great Britain ...	50
309.9	968	Grenoble PTT	France	2
309.9	968	Odessa	U.S.S.R.	10
312.8	959	Poste Parisien, Paris	France	60
315.8	950	Breslau	Germany	60
318.8	941	Algiers	North Africa.....	13
318.8	941	Goeteborg	Sweden	10
321.9	932	Brussels (2)	Belgium	15
325.4	922	Brno	Czechoslovakia...	35
328.6	913	Limoges PTT	France	.7
328.6	913	Dniepropetrovsk ...	U.S.S.R.	
331.9	904	Hamburg	Germany	1.5
335.2	895	Radio Toulouse ...	France	8
335.2	895	Helsinki	Finland	10
338.6	886	Graz	Austria	7
342.1	877	London Regional ...	Great Britain ...	50
345.6	868	Poznan	Poland	1.9
349.2	859	Strasbourg	France	11.5
352.9	850	Norwegian Common Wave		
352.9	850	Bergen	Norway	1
356.7	841	Berlin	Germany	100
360.6	832	Moscow (4)	U.S.S.R.	20
364.5	823	Bucharest	Roumania.....	12
368.6	814	Milan	Italy	50
373.1	804	Scottish Regional ...	Great Britain ...	50
373.1	804	Salonika	Greece	1.5
382.2	785	Leipzig	Germany	120
386.6	776	Toulouse PTT	France	.7
391.1	767	Midland Regional ...	Great Britain ...	25
395.8	758	Katowice	Poland	16
400.5	749	Marseilles PTT	France	2.5
400.5	749	Viipuri	Finland	13.2
405.4	740	Munich	Germany	100
410.4	731	Seville	Spain	1.5
410.4	731	Tallinn.....	Estonia	11
415.5	722	Kiev.....	U.S.S.R.	36
420.8	713	Rome	Italy	50
426.1	704	Stockholm	Sweden	55
431.7	695	Paris PTT	France	7
437.3	686	Belgrade	Yugoslavia	2.8
443.1	677	Sottens	Switzerland	25
449.1	668	North Regional.....	Great Britain ...	50
455.9	658	Langenberg	Germany	60
463	648	Lyons PTT	France	15
470.2	638	Prague (1)	Czechoslovakia...	120
476.9	629	Trondheim	Norway	1.2
476.9	629	Lisbon	Portugal.....	20
483.9	620	Brussels (1)	Belgium	15
491.8	610	Florence.....	Italy	20
499.2	601	Sundsvall.....	Sweden	10
499.2	601	Rabat	Morocco	6
506	592	Vienna.....	Austria	100
514.6	583	Madona	Latvia	
522.6	574	Muhlacker	Germany	100
531	565	Athlone	Irish Free State...	60
531	565	Palermo	Italy	3
539.6	556	Beromunster	Switzerland	60
549.5	546	Budapest.....	Hungary.....	120
559.7	536	Wilno	Poland	16
559.7	536	Bolzano	Italy	1
569.3	527	Tampere.....	Finland	1
569.3	527	Ljubljana	Yugoslavia	7
578	519	Innsbruck	Austria	.5
578	519	Hamar.....	Norway	.7
696	431	Oulu	Finland	1.2
726	413.5	Ostersund	Sweden	.6
748	401	Geneva	Switzerland	1.5
748	401	Moscow (3)	U.S.S.R.	20
765	392	Boden	Sweden	.6
1,083	277	Oslo.....	Norway	60
1,107	271	Moscow (2)	U.S.S.R.	100
1,145	262	Lahti	Finland	40
1,190.5	252	Radio Luxembourg(?)	Grand Duchy ...	200
1,224	245	Leningrad	U.S.S.R.	100
1,261	238	Kalundborg	Denmark	30
1,304	230	Warsaw	Poland	120
1,345	223	Kharkov	U.S.S.R.	35
1,345	223	Huizen	Holland	7
1,354	221.6	Motala.....	Sweden	30
1,442	208	Minsk	U.S.S.R.	35
1,500	200	Daventry National	Great Britain ...	30
1,570.7	191	Konigswusterhausen	Germany	60
1,639	183	Reykjavik	Iceland	21
1,639	183	Kaunas	Lithuania	7
1,639	183	Ankara	Turkey	7
1,714	175	Moscow (1)	U.S.S.R.	500
1,796	167	Radio Paris.....	France	80
1,875	160	Kootwijk (Hilversum prog.)	Holland	50

Foreign Reception in 1934

By JAY COOTE

AT the moment, it is difficult to say what 1934 has in store for us; it is too early to judge of the success or otherwise of the Lucerne Plan. On the other hand, we may expect the entry in the radio arena of a big batch of new transmitters in addition to a number of stations of which the power is to be increased without delay.

Our own regional stations are going up to 70 kilowatts and Droitwich, as the successor of Daventry, will take its place amongst the other European giants on the longer wavelengths. Its immediate neighbour will again be Königswusterhausen, for which the same power (150 kilowatts) is to be provided. In the same band we shall also find a re-invigorated Motala, and, without doubt, before the end of the year Radio Paris will have also taken on more energy.

Medium-wave Alterations

At present, we need not yet contemplate the advent of Madrid or Lisbon on the high waves as, so far, no step has been taken in their construction. On the medium waves, irrespective of the change over of channels, we are shortly to witness many alterations, and, in particular, as regards the German stations, for 1934 will offer from their studios a restricted range of programmes.

They have been amalgamated into three groups and, consequently, although material is drawn from the various units according to rota, there will only be three separate programmes, barring the special transmissions from the *Deuschlandsender*. This spells economy which, to-day, is the slogan of German radio. To compensate, however, work is being feverishly carried on at Langenberg, Breslau and Heilsberg, to convert these transmitters into 100-kilowatters, and thus put them on the same footing as Berlin, Munich and Mühlacker. Langenberg may be ready by the spring, the two last named some time in August.

Hamburg, too, as a high-power station, is anxiously awaited. In view of the principle of common waves adopted for relays, changes in the power of Stettin, Dresden, Danzig, or even the addition to the Frankfurt-am-Main group of another Rhineland station, do not arouse much interest. The fact only remains that over the medium-wave scale we shall be finding a number of strong German broadcasts.

As regards France, matters have not progressed in the same degree; the State has made plans for the construction of a complete P.T.T. network of capital and provincial stations, and work has already been started on them, but no great progress has yet been registered.

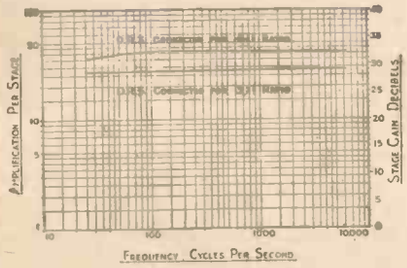
Strasbourg's Case

Exception, perhaps, should be made in the case of Strasbourg, from which doubtless you are securing better signals. The Lucerne Plan, as might have been expected, has badly hit the French private stations; a number of channels were allocated to France, and, obviously, the State grabbed the most favourable. Poste Parisien (Paris) and Radio Toulouse are the "lucky" recipients of shared channels, all others have been placed on national or international common wavelengths which restrict both power and, in some instances, activities.

Whether Radio Toulouse, with its new 80-kilowatt station, will remain on that channel is a moot point; its supporters may have something to say in the matter, but in respect to Poste Parisien, if rumours current in Paris are to be believed, there may have been a sound reason for making an exception in its favour.

Announcing — A REVOLUTIONARY TRANSFORMER DEVELOPMENT!

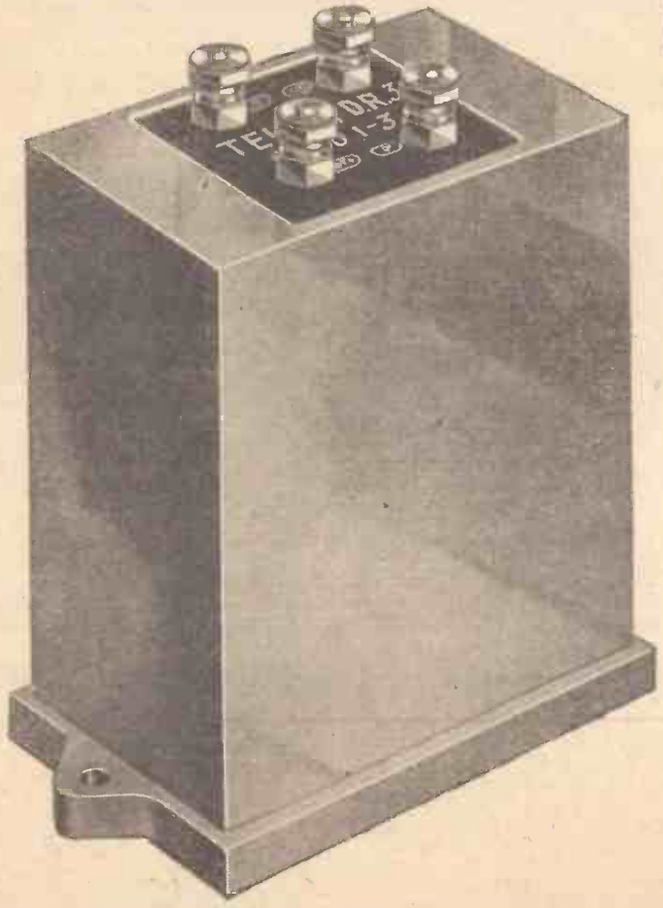
TELSEN D.R. TRANSFORMER



—the only L.F. Transformer *with a* STRAIGHT LINE CHARACTERISTIC!

INCORPORATED IN THE 1934

"Ether Searcher"



THE choice of the revolutionary new Telsen D.R. Transformer for use in the 1934 'Ether Searcher' is a fitting tribute to the remarkable efficiency of this amazing transformer. For it has a unique STRAIGHT LINE characteristic—giving uniform amplification of the entire range of audio frequencies! Several heat treatments under pressure and in a vacuum produce a rigid honeycomb structure absolutely freed from all impurities and presenting a very low distributive capacity. The spaced layer windings are impregnated with a non-hygroscopic material of very low specific inductance capacity which absolutely eliminates all possibility of shorted turns or breakdowns due to large magnetic surges. In addition, the inductance of the transformer is enormously increased by the use of a special nickel iron alloy core of very high permeability—the inductance of the D.R.3, for instance, is 150 henries.

D.R. 3 (ratio 3-1)
D.R. 5 (ratio 5-1) **8/6**

TELSEN COVER EVERY TRANSFORMER REQUIREMENT

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON, BIRMINGHAM

To Ensure Speedy Delivery Mention "A.W." to Advertisers

The Complete Cathode-ray Receiver

The various units comprising this receiver have been described in detail in preceding issues. The photographs show the complete assembly

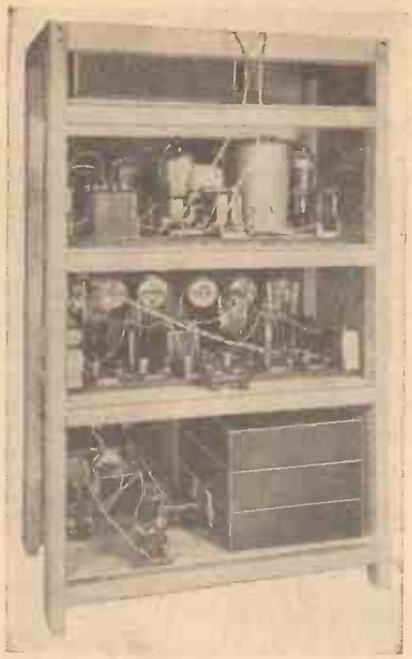


Fig. 2.—A rear view : from the top the units are—receiver, two time bases and exciter unit

HAVING assembled the framework of the complete cabinet the next step is to mount the various component circuits in place. The experimenter will have to decide whether the cabinet is being used solely for television experimenting, or whether it is required to use the exciter unit and one time base for other experimental work with the cathode-ray tube. If the latter is intended it is advisable to bring out some of the connections of the time base to separate terminals at the back of the baseboards to avoid fumbling in the cabinet when it has been made up.

The connections required for use with the tube as a wave-form indicator, or for other experimental work are :

(1) Lead to the grid of the horizontal time base for locking the wave.

(2) B_1 plate connection.

It is not proposed to go into details of the connections required as these have been fully described in the issue of "A. W." for November 4, 1933, but the single time-base circuit is reproduced in Fig. 1 as a reminder. In working, the plate B_2 is connected to the —ve. of the time-base H.T. battery and a separate terminal is not therefore required.

However, to fit up :

Put the exciter unit panel and baseboard in the lower compartment of the cabinet, against the extreme right-hand upright looking at the front, and screw it on the platform so that the panel is flush with the edge of the cross-battens.

It will be an improvement to alter the wires leading to the tube itself to avoid trailing lengths of wire when the cabinet is carried about, so at the back of the platform screw down a valve-holder and connect the leads from the exciter unit to this, cathode to the filament sockets, anode to the anode socket, and shield to the grid socket. We now have an intermediate plug and socket arrangement into which the flexible leads for the tube can be inserted when the apparatus is required. For the tube we shall require two lengths of double flex (or four-core flex) terminating at one end in a valve base and at the other in a valve socket.

By the way, notice the correct use of the terms "base" and "socket." The valve base is the part fixed to the bulb of a valve, carrying the pins, but the socket is the component mounted on the baseboard or chassis into which the valve is inserted.

An old valve base can usually be obtained from a burnt-out valve, and the flex threaded down the hollow pins and soldered. The interior of the base is then filled with pitch or wax to make a neat finish.

The remainder of the space on the lower platform is for H.T. batteries or accumulators, and a piece of $\frac{1}{8}$ in. three-ply should be cut to form a removable front to this compartment. The dimensions should be those of the panel of the exciter, 8 in. by 7 in., and to hold it securely in place two thin slips of wood may be glued on the platform and on the underside of the cross batten.

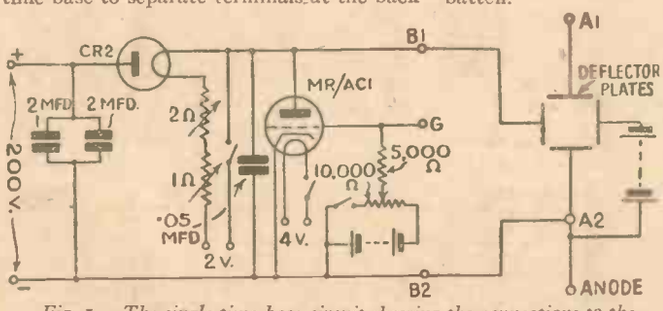


Fig. 1.—The single time-base circuit showing the connections to the deflector plates : note the biasing battery to centralise the movement of the beam

If it is decided to put the main H.T. batteries for the tube in this compartment, a switch can be fitted on this plywood panel to disconnect the H.T. when the tube is not used. A neat sunk switch is made by Bulgin or B.A.T. (Claude Lyons).

The two time bases are then inserted in the next compartment above the exciter, side by side.

If the time bases are already interconnected be careful not to pull the wires off when they are pushed into place on the platform. Having screwed them down, proceed to add another little refinement before going on to the next floor. A twin terminal block should be screwed at the back of the time-base platform and the leads for the deflector plates brought out to it. This will save feeling inside the time base for connections at a later date. The photograph of Fig. 2 shows this terminal block in place.

Before putting the receiver on the platform above the time-bases, check all its connections to see that they are tight and that the plugs in the grid-bias battery are well home. Screw the receiver down with a screw at each edge of the baseboard, and then proceed to wire up the whole assembly as follows :

Connect a length of twin flex from the output terminals of the L.2/DD. to the modulating terminals of the exciter unit on the same side of the cabinet. (See photograph, Fig. 3.)

Connect a length of twin flex from the output of the Mazda L.2 to the synchronising terminals on the second time-base. (Photograph Fig. 2.)

The correct polarity of the modulating terminals can be found by running the apparatus, when wrong polarity will be found to give a negative image.

The batteries for the time bases and the receiver can be fitted in the top of the cabinet.

If all is tested and found to be satisfactory, the sides and back of the cabinet can be covered in with three-ply sheet, the sizes required being :

For the sides, two sheets 12 inches by 29 inches.

For the back, one sheet 18 inches by 29 inches.

Continued on page 94

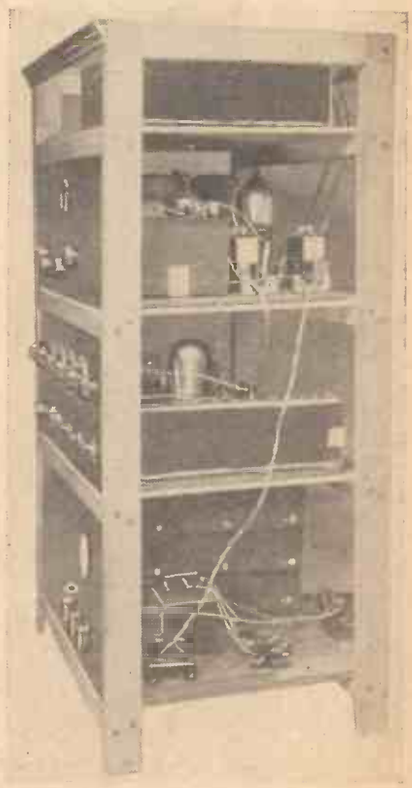


Fig. 3.—This photograph of the right-hand side shows the interconnection of the units

Making Your Mains Set Portable

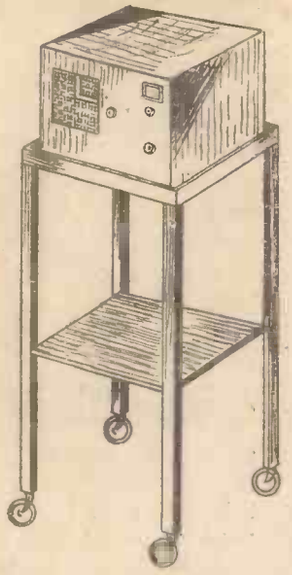
THE portable set has these days suffered somewhat of an eclipse. This has been due chiefly to two things—the popularity of the mains receiver with its possibilities of really good quality, and the undoubtedly lower quality normally attainable with a portable on a battery consumption that one envisages as reasonable for portable purposes.

The former is also not unconnected with the fact that most people cannot afford two sets—a high-quality set (say on the mains) for domestic use, and a portable for really portable purposes, such as outdoors, etc., where mains are not available.

The second may possibly be modified by the increasing use of low-consumption output stages for battery operation and by the increasing development of car radio.

The mains portable in suitcase form made a brief appearance, but did not stay long, and the fact remains that the modern mains set for domestic use is almost invariably on "aerial/earth" lines.

But it can be a very small aerial indeed and most mains sets can be worked, for at least the more local stations, on any sort of indoor aerial in any room of the house. It is thus really quite a good house portable except for one fact—that it is not very portable.



Mains set made portable on a simple wagon

Most mains sets are of robust construction and generally of a weight that the "man of the house" can possibly manage to move about, but which Mrs. Everyman (blessed name) finds just too heavy for comfort.

Quite a long time ago I was faced with this problem. The set—a present from a friend—was good but slightly bulky. It did not sit happily on any table that was available, and was not really comfortable to carry from room to room, which was often desired.

To solve this, I made up a thing on dinner-wagon lines and on dinner-wagon wheels. Any old dinner wagon would, of course, have done just as well, but it pleased my amateur carpenter skill and enthusiasm to make up one which the set just fitted.

The outdoor aerial was erected so that its lead-in was at a place suitable for the general headquarters of the set, so that "all-range" reception could be had at will in at least this position.

Two other rooms were fitted with indoor aerials, and the set wheeled to any one of these for such times as it might be wanted. Full volume from the local stations was thus obtainable at any of the places, and all the foreigners one wanted could be got in at least one site. Moreover, a child could move it—indeed, a child often did!

A later set with a mains aerial made the matter of portability (again for local station work) even greater, and a mains plug was then the only requisite of the site.

Easy with a "Long" Type of Set

The "long" type of set which has become popular this year is particularly well adapted to being accommodated on a dinner-wagon device. Some of these sets, of course, are already available on pedestals, and the addition of dinner-wagon wheels to make them completely portable within the house is ever so easy.

The same addition is also possible with most makes of "console" type; indeed, I have often been surprised that the makers themselves have not done more in this direction. The fact merely remains that they have not!

The arrangement has always proved of the utmost convenience, and I would have no hesitation in advising anyone, "Don't carry your set about—wheel it!" Only if you build such a thing for it, be sure that it is not too tall, or it tends to be top-heavy. G. S. Scott.

Straightening That Aerial Pole

YOUNG FRANK rang me up the other day. "I wish you'd come over and have a look at my new aerial," he said, and he sounded so upset that I went the following Saturday afternoon.

The first thing I saw as I walked in was a tall pole, leaning gracefully towards the house at an angle of about 15 degrees from vertical. It was a fine piece of timber, and must have been at least 35 ft. in length, which is pretty good for a single mast.

"Hello, old man!" cried my friend, who had spotted me as I strolled up the path. "I suppose you have seen the pole," he added rather ruefully. "The fellow next door helped me to put it up, and we don't seem to have made a very good job of it. To make matters worse, the guy-wire has slipped the pulley, and I can't shift the aerial either way."

I glanced up at the top of the mast. "Why," I exclaimed, "where have you got your pulley?"

It was round the side of the mast, and the wire had to do gymnastics to point in the direction of the house.

"We didn't notice that until we had finished bedding the mast down," Frank replied sheepishly. "Neither of us had tried putting up a pole before, and we couldn't think of everything."

I decided that the only thing to do was to pull the whole lot down, so we got the man from next door to lend a hand once more, and started to dig away round the pole. The earth was not really bedded down, and it was quite easy going.

"How deep have you got it?" I asked.

"About two feet."

"Good heavens, that's not enough. A mast of this length needs at least three, if not four feet."

So when we had got it down, I put our willing neighbour on increasing the depth of the hole, while we made an inspection of the pole.

"Oh, I see you've creosoted the base well," I remarked. "That's the best thing you have done so far. But you need not have bothered right at the bottom. About two feet above and below the ground level is the only part where it is required. A mast never rots at the very bottom, the ground level is the place to watch."

Frank was rearranging the wire over the pulley. The latter was of the close-fitting type, but the wire had slipped it all the same.

"The best kind of pulley to get," I said, "is one with a brass wheel. An iron one with an iron casing like this one will not resist the action of the weather, as like metals have a tendency to become welded together. The only trouble is that brass ones are darned hard to get hold of," I added, recalling the troublesome times I had had myself over this particular problem.

As the next best thing, we smeared vaseline all over the pulley, which soon began to work sweetly. Then we turned the pole round so that the pulley would face the house when we had got it up again. By this time our good friend with the spade was red in the face, for he had come to clay and was finding it hard work.

"That'll do fine," I said, when the hole was about three feet deep, and we stretched the guy-wire along the pole, fastening each end tightly so that the wire could not possibly foul the pulley while we were getting the pole in position.

When it was sitting "fair and square" in the hole, we tilted the mast back away from the house at an angle of about ten degrees from vertical.

Strange use for an aerial system!

"Carry on filling her in now," I said, and while Frank wielded the spade, I got the neighbour to pummel the earth down all round with a batten of three inches by three. About half an hour saw the job through, and we soon had the aerial wire in position for reception. There was a chimney bracket at the other end, so we had no trouble in that direction.

Frank was highly delighted, of course, to have his aerial up again, and properly this time, so that he could raise and lower it and make as many adjustments to it as he liked. The neighbour was a little dubious, for the pole still had a distinct backward tilt.

"If it isn't dead straight in three weeks," I said, "let me know and I'll put it up again, by myself."

I have not heard from them yet. F. D. Cawley.

Pressing Cabinets Two at a Time

FEW more striking processes in radio-set manufacture can be called to mind than the amazing bakelite-pressing plant at the Ekco factory, Southend-on-Sea.

Two cabinets are moulded at a time by new marvels of hydraulic machinery. Fourteen presses are in operation at the present time, including one weighing 1,500 tons and two weighing 1,100 tons. Compared with the "crew" of two men who work them, these machines are veritable giants, standing 35 feet high from their bases, which are sunk in the vaults below the main machine room.

The giant machine of 1,500 tons producing two cabinets at a time has a hinged die weighing 15 tons. No wonder that to work such apparatus it takes 10,000 units of electricity a day!

What a job for the "crew" it must be. A thrilling control of immense power. The operator frees the electrically heated chromium plated steel dies from dust and bakelite chips by means of a compressed air jet. His assistant fits into place the brass and chromium plate inserts and then he pours in a carefully measured scoop of raw bakelite powder. An electrically worked lever then plunges the upper die into the prepared mould.

The rest is done without human aid. That powder, in a very short time, is squeezed by these magical machines into the delightfully grained bakelite cabinets so well known in connection with Ekco sets.

Postcard Radio Literature

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," AMATEUR WIRELESS, 58/61 Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire. Please write your name and address in block letters.

W.B. Microlode

HAVE you seen the W.B. catalogue on the Microlode loud-speakers? You should certainly get one. If you are wanting a new loud-speaker for your receiver or an extension loud-speaker you will be wise to invest in a Microlode. There is a model to suit the small receiver or the super-gram. The cabinets are of modern design, being walnut finished. Also included are class-B units, valve holders and switches. — **129**

Helpful Heayberd

Mains components for almost any radio or amplifier equipment can be obtained from Heayberd. Their catalogue contains information on these components, with fourteen different circuit diagrams of mains units, including trickle-chargers. You can get a transformer to step-up mains of 100 and 110 volts (A.C.) to the normal 200 to 250 volts, thus enabling a set designed for standard mains to be worked from the lower voltages. There are also two pages devoted to helpful hints on Ohm's law (that law which many people find difficult to understand). **130**

"Inside Knowledge"

You want inside knowledge on batteries. This booklet is produced to give you that information. The choice of size (voltage and capacity) is fully explained. First considerations, the importance of grid bias, general notes, and some high-tension don'ts are also included. Then there is the list of Siemens batteries and accumulators. A very interesting booklet. You should get a copy: it may help you to economise. **131**

These Valves Mean Better Radio!

Continued from page 62

that it was impossible to smooth out the hum when using D.C. valves.

I advised him to buy a set of the new Mullard D.C. valves—an SP20 high-frequency pentode, an HL20 detector, and a Pen 20 output valve. He was rather sceptical because he said he didn't feel that D.C. valves were really any good.

Anyhow, he got his set finished, quite a straight set, and I went round and listened to it. On the headphones you could not hear a trace of hum and when his mother had gone to bed we just tried out the set on the loud-speaker to see what we could do with it.

There is no doubt about it that these valves were quite as good as their A.C. equivalents. The quality was really good, while the sensitivity was of the highest order.

Instead of grousing about being on D.C. mains why not go right ahead and make yourself a D.C. set? You are no longer restricted in the types of valves you want to use. Mullards can supply two types of high-frequency pentode and a double-diode-triode in addition to the usual detector valve and output pentodes. You see, with all these valves available you can make any set you like, straight set, super-het or even a transportable.

If you are still thinking about the idea of class B, but are tied up for space, have you thought of the new Hivac combined driver and class-B valve? This is a valve of entirely new design which I have just been trying. It is three valves in one—a three-electrode drive and two triodes in class B. With this valve you can convert your existing set to class-B amplification without taking up very much more space and as it uses the conventional seven-pin base there are no snags.

The driver transformer can usually be squeezed into your present baseboard and if there is not room for the output transformer this can be fitted to the loud-speaker. This valve gives about 1.5 watts.

Talking about battery valves, perhaps the most startling innovation has been the Mazda double-diode-triode for battery use. This is designated the L2DD and is the only one of its kind. If you want to take advantage of automatic volume control and at the same time obtain really good quality this is the valve to do the trick.

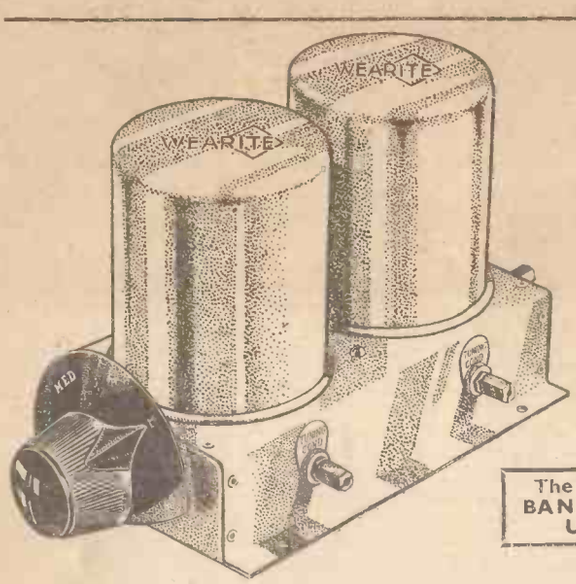
Worth the Closest Attention

It is very similar to the A.C. version and fulfils a similar function, that of rectification, automatic volume control and the boosting of volume. This valve certainly merits your closest attention.

Taking things all round, the last few months have been very fruitful as regards new valves. There is hardly any set that cannot be improved with one new valve, while many of them can be altered out of all recognition if double-diode-triodes and pentagrids are considered.

Perhaps the easiest valve to use will be the high-frequency pentode, because if you want to use it in your present set you can have it with a five-pin base, or if you want to make a new set it is available with the modern seven-pin base.

I should strongly advise you to go along to your local dealer and scrounge a few valve catalogues and just compare the characteristics of the modern valves with those you have in your own set.



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THE WEARITE COILS FOR THE UP-TO-DATE CENTURY SUPER

One G.N.2 Band-Pass Unit **21/6**

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ETHERDYNE SUPER A.C./D.C. THREE

and now THE ETHER SEARCHER

It is significant that during the past year the most successful circuits put out by "Amateur Wireless" have always included Amplion Permanent Magnet Moving-coil Speakers in the specification.

Follow the lead of successful designers; fit Amplion speakers and feel complete confidence in your set.

Clever Magnetic structure is responsible for the extreme sensitivity and pure tone in Amplion Speakers, while the robust overall construction ensures permanent reliability.

Two models are recommended for the "1934 ETHER SEARCHER" both of which are fitted with all-purpose universal transformers.

THE "M.C.22"	7 in. cone	Price **39/6**
THE "AUDIOLA"	9 in. cone	Price **49/6**

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Radio News from All Europe

From Our Special Correspondents

PARIS

HOW fast do electric waves travel from one station to another? Generally it has been accepted that the velocity of electric waves is equal to that of light, which is 300,000 kilometres per second. Practical experiments recently made in France and elsewhere have, however, shown that whilst this fact is correct for the electric waves which travel through the ether, it does not apply to wireless waves sent out by a broadcasting station.

Lately two enthusiastic French radio engineers have carried out tests to ascertain the real velocity of waves. One of them, M. Jounaust, worked at Paris, and the other, M. Stokyo, at Buenos Aires. They measured, tested and calculated, and eventually arrived at a speed of 268,850 kilometres per second. This lower speed is, of course, explained by the fact that the waves travel not directly through space but are often thrown back from an upper layer of the atmosphere to the earth and reflected again on the way from one station to another.

Thus an even lower speed was found when tests were made during disturbed atmospheric conditions and the figure then ascertained by the French engineers was 244,600 kilometres per second.

ZURICH

AN interesting method of checking whether people have paid their licence fee has been adopted by the broadcasting authorities. Every listener who has paid his fee is visited by an official who—much to the delight of the children who may be present—places a transfer picture on the wireless set which will last for at least one year.

The picture shows the coat of arms of the Government and carries the inscription, "Licence Fee, 1933 [or 1934, whichever the case may be] paid."

Inspectors who call on radio listeners to find out whether they have paid their fee need only look at the set for the transfer mark and there is no need to search among old papers or receipts for the official licence.

BUDAPEST

AN even more original way to make its listeners pay the licence fee has been invented by the Hungarian Broadcasting Corporation. Much to their surprise and indignation, the number of wireless listeners has fallen instead of increased recently, and energetic steps were decided upon.

First, it was announced that each new subscriber would be entitled to listen for one month free of charge, so that his licence fee covers really thirteen instead of twelve months.

Secondly, motor cars with a range of both expensive and moderately priced sets are calling from house to house at appointed times to give "free concerts" to anyone who may not yet know the delights which can be obtained from wireless. This may sound strange to English readers, but here in Hungary there are many people who have never yet seen or listened to a radio set.

Thirdly, the Postmaster General has arranged a lottery, a sweepstake in which each wireless licence represents a ticket. A large number of prizes are being given, reaching an aggregate of 30,000 pengös, and the numbers drawn in the sweep are identical with the numbers of the wireless licences issued. Thus, each listener receives not only the benefits of being a subscriber to the broadcasting programmes, but participates in a lottery, and all with the full authority and even inducement of the Government!

BERLIN

IN future, all German teachers, whether in elementary or other schools, must understand how to assemble and work a simple radio set. A regulation to that effect has been issued by the Minister of Education. Another proof of the great importance attached by the German Government to wireless as a powerful means of propaganda, as well as of education, can be seen in the fact that a special Chair for broadcasting has been endowed in the Political Sciences Faculty of the University of Berlin.

◆ ◆ ◆

Blocks of flats are now becoming so frequent in all the larger German cities where there are several parties anxious to fix outdoor aerials, that trouble arises because several aerials fixed close to each other will not work well, and nobody can enjoy proper reception.

A sort of communal aerial is therefore being marketed by leading German radio manufacturers, or is being arranged by enthusiastic

amateurs. It will lead the energy off a high aerial to an aperiodic high-frequency amplifier and then to the various radio sets in the block of flats. This will ensure uniform and even reception for each set. The various branch lines from the communal aerial can be of any length up to 25 metres and quite a number of listeners can join in.

◆ ◆ ◆

A very wonderful apparatus has recently been constructed by the staff of the University of Rostock's Eye Clinic. The director of the clinic, Dr. W. Comberg, has designed it for the purpose of saving the sight of those of his patients who are threatened with blindness. As is more often than not the case, a foreign body cannot be detected if it enters the eyeball.

All the difficulties in detecting the "mote in thy brother's eye" are overcome by the application of this new apparatus. It consists of nothing but a radio amplifier which can detect with the greatest ease the position of any foreign body in the eye or the body of a person.

As to its practical application, the work of the apparatus is exceedingly interesting. It is first connected to the mains and then begins to hum while being moved round the eye. The song of this radio set is confined to one tone only and remains thus—until it lights upon a metallic body in the eye!

From the moment this machine starts to detect the location of the metallic body—like the phrase used in the children's game, "cold, warmer, hotter, hot"—the tone rises and becomes more distinct until it remains at a constant level, indicating that the position has been determined.

As a result of numerous searching tests, this machine has been so perfected that now a foreign body can be detected to within one tenth of a millimetre of its exact position. And it is hoped that in the shortest possible time even this infinitesimal error will be removed.

The B.B.C. Gets Over Two Snags at Leeds

From a Special Correspondent

IT is common knowledge now that London's Broadcasting House is not such a perfect marvel of a place as the public was led to believe when it was first opened.

The new Leeds Broadcasting House has also revealed snags since it came into use, though in this case I am happy to report that the troubles were only two in number and they have now been successfully overcome.

You will remember how an old Quaker Meeting House at Leeds was taken over by the B.B.C. and converted into a sumptuous programme-producing centre for the whole of Yorkshire. The principal studio there is one of the largest in the country and is ideal for those large brass bands and choirs for which Yorkshire is famous.

Owing to its lofty roof and spaciousness, however, it has not been very successful for shows including both music and speech.

Listeners to these concerts may have noticed that speech was apt to be boomy. This was due to the fact that both music and speech were picked up by a microphone suspended on an elaborate universally adjustable arm from the ceiling.

A second microphone has now been installed, however, mounted on a short stand movable over the studio floor, and by using both mikes the producer can pick up the music with normal echo and the speech without abnormal echo.

The second snag was that the designer forgot to provide a studio for radio plays. The big studio, as explained, was unsuitable for speech. The second studio, which is for talks, is too small for the cast of anything much more elaborate than a sketch. Moreover, many plays necessitate the use simultaneously of several studios; two is hardly enough.

So the B.B.C. has wired the artists' waiting room at Leeds as a studio. A mike can be plugged-in there and red and green signal lights for giving cues from the control room have been fitted over the doors.

The Complete Cathode-ray Receiver

Continued from page 86

These panels should be fastened with wood screws or with wing nuts on bolts passing through the cross and side battens, in order that they may easily be removed.

[Two misprints occurred in the theoretical circuit diagram of the C.R.4 receiver, described on page 1134 of the issue of December 23.

The lead from the diode of the Mazda L.2/DD. should be connected via the .25-megohm resistance to the L.T. positive, and not the negative as shown.

The value of the condenser between the diode and the grid of the L.2/DD. should be .005 microfarad, and not .0005 as shown.]

Sets of the Season Tested

Amplion Electravox A.C. Four

Attractive is the word to describe the appearance of this Amplion receiver

WHEN we first received this four-valve Amplion set, we had no idea of the price that had been fixed for it. Consequently, from its external appearance we were quite prepared for the price to be in the region of 13 or 14 guineas.

The cabinet is the modern, long, table type, with the receiver chassis on the left-hand side and the moving-coil loud-speaker on the right-hand side. This cabinet is constructed of light walnut with a fancy design with a very bold fret. Although the cabinet is of startling design, it harmonises very well with the average furniture and gives the air of being very expensive.

Controls Simple to Operate

The whole receiver looks, and *is*, very simple to operate. There are only three major controls. On the left-hand side is the wave-change and on-off switch, both functions being combined in the one switch. In the centre is a large tuning knob which is split, the front half being an adjustable trimmer, the rear half being the main tuner. On the right-hand side is a volume control, which is very smooth in operation.

This is a very desirable feature in a volume control as so many makers are inclined to overlook the quality when the volume is reduced to a low level. With this Amplion set the quality remains almost constant, irrespective of whether the volume is maximum or minimum.

The circuit is quite simple; it is perhaps this simplicity that accounts for the very fine results that can be obtained by even the most non-technical user. It consists of what is fundamentally a three-valve set with an additional valve to rectify the A.C. mains. The aerial is coupled to the first valve through a very sharply tuned circuit which effectively prevents cross-modulation.

The first valve is a Mullard high-frequency pentode with variable-mu characteristics. This is in turn coupled to another high-frequency pentode, a Mullard SP4, with a fixed grid base. This valve makes an ideal detector. It will handle considerably more volume than the average screen-grid valve, whilst the output is sufficient fully to load the PM24M, although the coupling between the two valves is simply resistance capacity.

Throughout this circuit it is quite obvious that every endeavour has been made to maintain quality at the highest level. The PM24M output pentode valve is one specially designed to give a high undistorted output. With 250 volts upon the anode and auxiliary grid, 3,000 milliwatts output are given without any trouble.

A very effective tone-correction circuit is included, which preserves a very good balance, so that the high notes are not unduly accentuated.

The moving-coil loud-speaker is of the energised type, which accounts for its sensitivity. The field current is obtained from a valve rectifier which gives 120 milliamperes at 350 volts, which is enough to energise the loud-speaker as well as to provide high tension for the three valves.

As this receiver is of the straight type we decided to use it on an aerial having a total length of about 50 ft., as this should be about the right length to preserve selectivity and at the same time give adequate volume.

Well thought out is the chassis of the Amplion Electravox model

We found afterwards that we need not have been quite so particular about the aerial, because even with a length of wire to the picture rail quite a large number of stations could be picked up. The tuning range is rather wider than usual, being from 195 to 550 metres on the medium waves and 700 to 1,950 metres on the long waves.

Listeners to Aberdeen, Newcastle or perhaps Radio Normandie will have no difficulty in picking up these stations with quite a number of degrees to spare. During a test in the early evening we were able to tune-in sufficient programmes to satisfy even the most fastidious listener.

What We Picked Up

We will give you an example of what we could hear. Cork and Radio Normandie were received at good loud-speaker strength and free from mutual interference, while slightly above was the Frankfurt programme, with only the slightest background from the National programme. Heilsberg is usually an easy programme to hear, but with this receiver the quality really was good and you could not tell the difference between this German station and the local.

Between 340 and 350 metres there were quite a number of stations, all at good loud-speaker strength. Going to the top of the tuning scale Budapest was the last station to be heard. This with about 3 degrees to spare.

On the long waves practically all the more worthwhile stations could be relied upon, including Moscow and Lahti. So, taking the receiver all round, the sensitivity is very high on both wavebands.

BRIEF SPECIFICATION

Makers : Amplion (1932), Ltd.

Price : £10 10s.

Valve Combination : VP4 high-frequency amplifier, SP4 detector, resistance-coupled to a PM24M pentode output valve. The rectification is by means of a full-wave valve, type BW3.

Power Supply : A.C. mains, 200 to 250 volts, 40 to 100 cycles.

Remarks : This four-valve receiver gives fine quality, while the sensitivity makes long-distance listening a pleasure.

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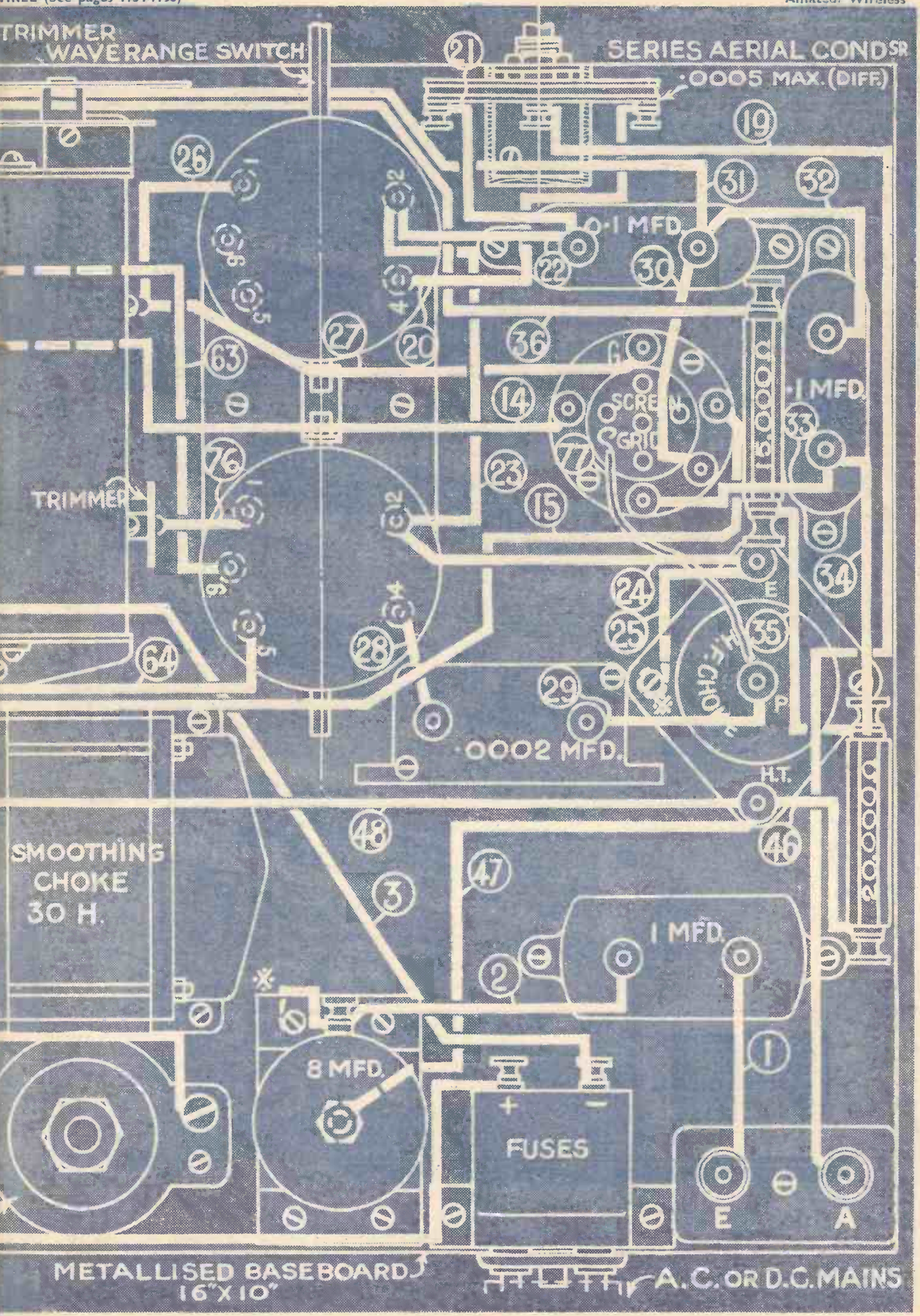
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